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CHILTON COMPANY
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Chestnut and 56th Sts.,
Philadelphia, Pa.

Editorial and Executive Offices
239 West 39th St.,
New York, N. Y.

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Member, Audit Bureau of Circulations
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Indexed in the Industrial Arts Index.
Published every Thursday. Subscription Price: United States and Possessions, Mexico, Cuba, $6.00 Canada, $8.50 Foreign, $12.00 a year. Single copy, 25 cents. Cable Address, "Ironage, N. Y."

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THE IRON AGE

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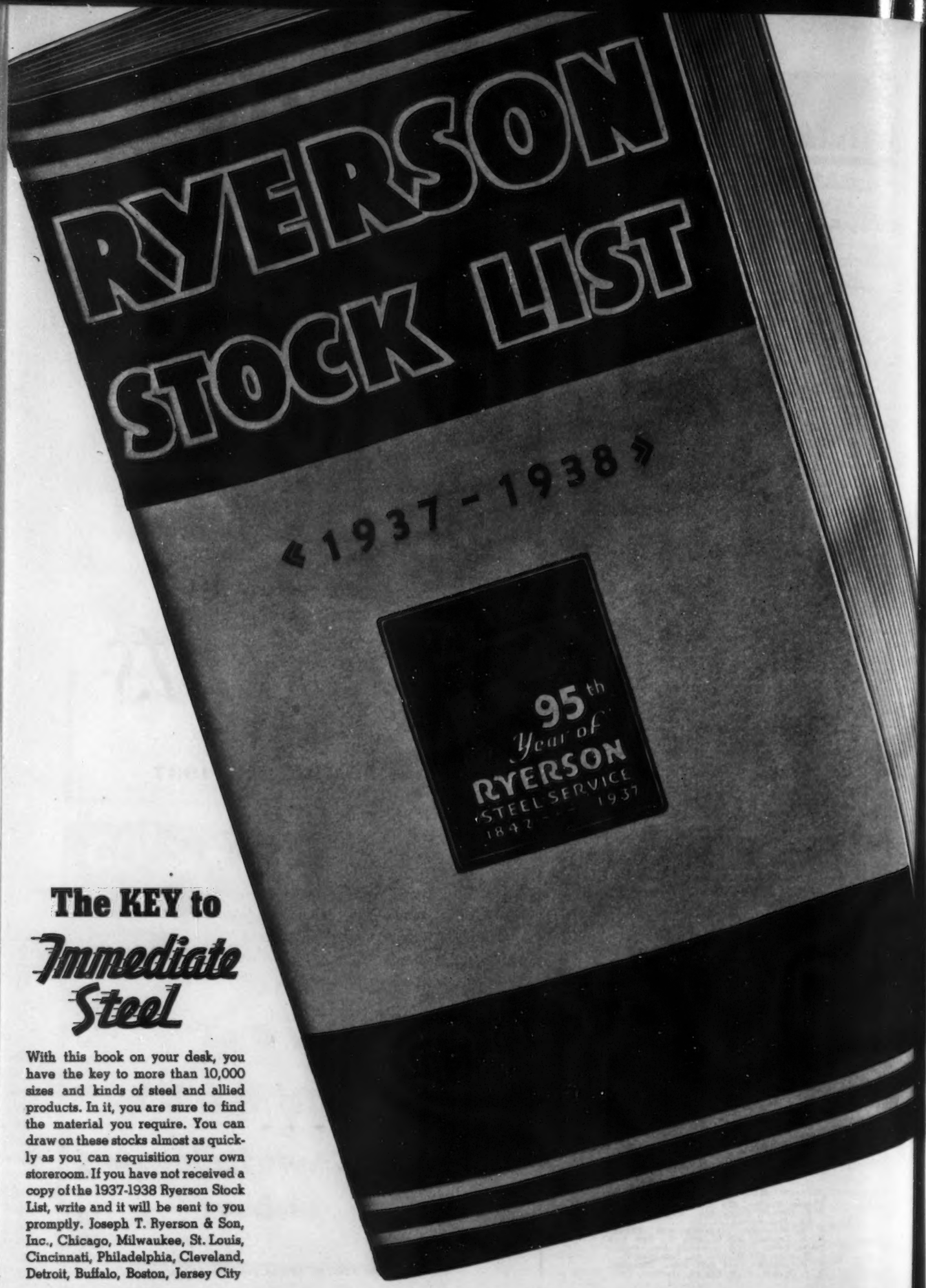

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September 16, 1937

ESTABLISHED 1855 Vol. 140, No. 12

Bring Mohammed to the Mountain

YOU do not find many successful business men or industrialists among the members of Congress. Occasionally a few of them may succeed in crashing the gate, but the number is so small that the exception proves the rule.

Just why this is so, it is hard to say. It might not be bad for Congress or for the country, either, if we had among our legislators a fair proportion of people who have had first hand experience with machinery, with meeting a payroll and with making a profit.

This is no reflection at all upon the kind of people that we now have in Congress. Our Senators and Representatives, while very largely drawn from the legal profession, are men and women of character and intelligence above the average. Most of them can be trusted, regardless of pressure, as we have so recently seen, to defend the principles of Americanism, even at the risk of their own political necks.

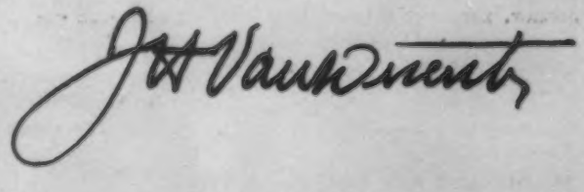
Today, Congress spends most of its time and energy considering bills which have to do with business and with industry. We cannot blame our lawmakers, if action upon these bills is such as to jeopardize the public interest as well as the private interests of business and industry. On the contrary, it is distinctly the fault of business men and industrialists who not only have been averse to "going into politics" but have also neglected to properly present industry and business to those who are in politics.

Well, if the mountain won't come to Mohammed, at least Mohammed can go to the mountain. And now is as good a time as any.

Every Congressman who is not a dyed-in-the-wool business baiter—and there are only a half dozen of that stripe—would undoubtedly welcome an opportunity to learn more about business and industry. They would like to learn it at first hand and not through lobbyists or other propagandists. **Give them this opportunity!**

If you are proud of your plant or your business and what these mean to your employees and your community, invite your Congressmen to come and get acquainted. Put your invitation on the ground of their needing to know all they can about the important subjects that await their decisions in the coming session. Let them understand that your invitation is not given with the idea of propaganda but of giving them an opportunity to get not only your viewpoint as a "meeter" of payrolls and a creator of jobs, but also the viewpoints of labor and local tradesmen. First hand information, without the intervening smoke screens of either employer or union labor, paid propagandists.

Legislators will need a clearer understanding of business and industry at the next session of Congress, and this is the most practical way to help them get it.



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STALIN'S crane brings a sizable ladle of hot pig to an open hearth at the Metallurgical Combinat in Magnitogorsk. Picture by Sovfoto.

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Russia Answers America's Open

THE "1936 Proceedings of the Open Hearth Committee,"* contains many discussions of problems facing American steel makers today. An examination of the valuable book shows that many of the questions demanding attention here are also pertinent to current problems in the Soviet iron and steel industry. The answers given in this book to those questions asked were given by men who think, first of all, in terms of cost. Over in Soviet Russia, those same questions would have been answered by men who think only in terms of "quantity production." By that it is meant that no one there thinks primarily of quality or cost, but that the immediate question is how to increase production from a given unit. And since America is, perhaps, entering an era where supply is conceivably going to be less than demand, the author, for one, thinks that Russian answers to American questions may not only be of interest but of definite value. Therefore, the 1936 proceedings could be examined section by section to see what answers a Russian open hearth engineer would make.

First, on page 15, consider the question of depth of bath. The standard 150-ton Russian furnace was designed with a depth of bath of 730 mm. (30 in.), because Americans advising them believed that for cleansing the metal of the impurities incident to "high ore" charge, a shallow bath would be best. After five years of work in four big shops, the Russians have, by constantly cutting down these bottoms, established outputs such as the record of No. 5 Makeevka, which made 126,000 tons in 1935. Therefore, they have decided to give their new standard furnace (a 190-ton unit) at least 1100 mm. (or 44 in.) depth of bath.

At Azov Stahl 340-ton heats were made on a tilting furnace with a metal and slag depth of 1600 mm. (64 in.), and over 600 tons per day was made for a 15-day period. On a 300-ton stationary furnace, with the same charge and with a bottom 1150 mm. (45 in.) deep, not much better than a 14-hr. heat time could be done, which, to them, was proof that given a furnace of the same thermal power, potentially, a deeper bath would increase production. Therefore, the 165-ton ladles purchased from Germany have had the tops raised and the bottoms dropped until they now hold 220 tons, and that is the heat weight today from the standard 150-ton furnace of 56 sq.m. (602 sq. ft.) hearth area, at Kuznetskstroy, Magnitogorsk, Makeevka and Zaporoje.

However, this brought up the questions American operators asked concerning insulation and thickness of bottom on page 106 of the proceedings. Russian magnesite, when calcined, is 94 per cent MgO. More time, higher temperatures, greater care, and extreme precision in use of slag are necessary in making bottom. Hence the number of poor quality bottoms is greater than in America, and the amount and severity of holes greater. Deeper bottoms give more slope and result in fewer holes.

* American Institute of Mining and Metallurgical Engineers.

But, if carried to the extreme (as in No. 2 furnace at Azov Stahl, where a very thin, 7-in., clay brick base, and 4½ in. less magnesite brick, and 4 in. less magnesite and slag monolith, making in all a bottom 10½ in. thinner than on No. 1 furnace was constructed) then a very definite slowing down of the furnace is found to result. The reactions just won't take place. So, the Russians have studied this, and have with good results made steel in the standard 150-ton furnace with a bottom thickness to hearth of 800 mm. in place of 1150 mm., or 32 in. in place of 44 in., and this without insulation. At Zaporoje, for all soft steel for the new strip mill, they have only 6 in. of magnesite and slag monolith and no plastic or magnesite cement. As magnesite appears to be plentiful in the Soviet Union, three or four years is enough life from a bottom—or, so they think in their planning for greater productivity per unit.

Since the ability of the furnace to take a great thermal input without too frequent delays for brick repairs is closely related to quantity possibilities from a unit, the Russian engineer would answer the questions as to "what bricks are best for certain areas?", asked on pages 114 to 117 of the proceedings, by saying, "use magnesite bricks (for that is all he has) wherever possible. Then make a sloping front wall as well as sloping back wall, and build these walls 900 mm. (35 in.) thick at slag line and 460 mm. (18 in.) thick at the skew backs, put in water cooling wherever possible, and try to make the upstairs of the furnace last as long as the roof without a 'gas off delay'." Then, like young Bolshakof, superintendent at Zaporoje steel, he will have a front wall and a roof all ready set up in steel frames, a system called "block repair."

He will knock in all old work, trim up the base, set the "front wall," arches and all, in place with the crane and then follow with the main roof which is, if the author remembers correctly, in five sections. Then a liberal amount of grout, and slow heating up, and a roof is obtained which, when the author saw it, was 80 heats old and doing well on a furnace which had just tapped a 215-ton heat in 9 hr. and 20 min. from tap to tap, on 80 per cent iron charge. Note particularly that this repair is possible in 15 hr. As an example of the free play given to local ingenuity, as well as a sample of imaginativeness and daring, this operation is remarkable. If those fellows had our brickmakers to give them the new types of nonspalling, inert mixtures of chrome and magnesite in their front and back walls and in bulkheads and division walls and our superfine roof bricks, they would go crazy on "tonnages." They would, the author believes, make 175 heats of 200 tons for an average campaign, and have an average heat time of 10 hr. from tap to tap.

Among other questions discussed

Hearth Queries

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By RALPH VAILL

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THE open hearth department in construction at Magnitostroy, U.S.S.R.

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in the 1936 proceedings, one encounters the very valuable remarks of Dr. Felterer, pages 135 to 140, on the broad question of "hot metal" and "open hearth mixers." While the Soviet operator would not care a hoot about the "residuals" in "scrap," this "hot metal" proposition is of burning interest to him. At Azov Stahl the Russians followed an iron-clad routine as to rotation of materials in charge, time of heating, time consumed in charging various portions, and maintained a most careful supervision over the heat input during this period, and then poured in 230 tons of iron on top of the 100 tons of scrap, 60 tons of ore, and 20 tons of lime that they had mixed and cooked to the "Queen's taste." Yet the results were not always the same. If they were what was wanted, then the heat "went to town" in 10 hr. and 30 min. from tap to tap. While they were pouring the iron in one door, slag would come from the other two. Two hours after pouring in this iron they had finished taking off three or three and one-half thimbles of slag. But frequently, this was not the case. The history prior to hot metal introduction on one heat would be identical to a previous heat. Yet the iron would lay in there like a sick cow for an hour or so, and then with a mighty roar would lift the whole burden into one floating mass, which the Russians called a "Chelyuskin," in honor of the Soviet ship that had sunk the previous summer in the Arctic Sea. Why was this? Simply that the Russians had no Fitterer to study this terribly significant question of temperatures in iron. He, however, hated silicon and loved manganese. He put tuyeres in his 1300-ton mixer, and blew compressed air into his metal to get this silicon (which he had ordered not over 0.70, and wanted as near 0.50 as possible) out of the iron. He experimented with soda ash, with lime, and roll scale, and with high temperatures. And he got nowhere. Nonetheless, he could have contributed much to Americans about the advisability of low silicon and high manganese and their relation to slag volumes in open hearths. From what the author has seen of 0.50 silicon iron, he believes the Russians and those people in America now promoting desulphurization in the mixer, (which, it is assumed, means low slag burden in the blast furnace) together with the new study of iron temperatures, are going to reopen this old "hot metal" question with a bang.

On page 162 of the proceedings, the American open hearth man listened to William Kitto's intelligent remarks about magnesite nozzles and screw type head. To all of it the pouring floor manager from Russia would have nodded assent; for in 1934 they definitely discarded clay nozzles and universally used those made of Ural magnesite. Only, theirs are 15 in. long and have an opening of 35 mm. or 40 mm., that is 1½ in. to 1¾ in., never greater, for any grade of steel. At one place, they left the well in the ladle and tamped these nozzles in with a damp mixture of fireclay and ganister, or loam, as here. But the Russian prefers the nozzle to be set into a big nozzle brick with a minute clearance between them, just so a well slurried nozzle can be pushed into place; or else, he likes to introduce it from the bottom, with a special locking washer. Either way works well, but the latter is rather expensive after a cold heat. And when one gets a cold 200-ton soft heat, with only one 15-in. long magnesite nozzle with a 1¾ in. hole in the ladle, then the author's advice is to send the truck for tanks and pipes, and prepare to take the ladle out of service for the next four days. These magnesite nozzles not only have high heat conductivity, but they have elegant power of refrigeration. But they are indispensable in Russia. The clay nozzles simply would not stand up, while the clay sleeves did, and did it beautifully; the screw type head gives very good results and is widely used.

As an example of the chilling effect of magnesite nozzles, it is best to cite a personal failure, which happened during a demonstration on how to pour into molds equipped with clay hot tops from an intermediate ladle holding 20 tons, equipped with three stoppers and suspended by a long stretcher from a 50-ton hoist so that it was under 200-ton ladle. The metal was being poured into 8-ton ingots, three at a time, shutting off and chilling the ingot at the junction of the hot top. A three-inch magnesite nozzle was used in the big ladle, and, because of a low ferrostatic head, 2-in. clay nozzles were used in an intermediate ladle. Everything went well during the first part of heat. Very ticklish, of course, what with all the people inexperienced and the oxygen equipment most primitive. Everything just had to go well. After 12 molds, or four buggies were poured, there was a great sigh of relief. But the fifth group filled only part way when a tremendous splashing of the steel in the little ladle announced it empty. I dashed to the upper platform, saw the stopper keyed wide open, and a little ½-in. stream coming from the big ladle. I knew the heat to be hot, and the pyrometer was known to be good. When they said these axle heats were 2660 deg. to 2678 deg. F., without correction we

TEEMING steel in the open hearth shop in Makeevka (Donbass, Ukrainian Sov

of the S. M. Kirov Metallurgical Works Soviet Socialist Republic). Picture by foto.

always could bottom pour them. So what? Nothing except that the 3-in. magnesite nozzle, keyed wide open from the start, had frozen itself on a hot heat, as was demonstrated by getting a good shut off on seating the stopper, cleaning out the nozzle column with the lance, and finishing the heat without trouble.

The Russians, quite naive boys about FeO slag control, could have cited its value to them if asked the question put by Mr. Reinartz on page 216: "How to make good steel from high phosphorus iron?" Normally, iron in Russia from Magnet Mountain ore, or from Krivoi Rog ore gives low phosphorus—about 0.150 to 0.200—and that when mixed with high phosphorus manganese ore sufficient to give 2.5 per cent manganese in the iron. But they charged 20,000 tons of run-off slag per month for a production of 130,000 tons of iron, and about 30 per cent inferior ore from Altai Mountains. This gave 0.300 per cent phosphorus in the iron. The charge was 80 per cent iron and only 6 per cent lime.

They talk quantity in Russia. So they don't want a high limestone charge. But what to do? All rail heats, if caught coming down, and boiled for any length of time before tapping, started "going up" on phosphorus before the end of refining period and eventually finished over 0.050. Now the Russian likes an open heat and hates a heavy thick slag. It's no good anyhow on mixed gas, with a fixed part furnace. He wants a slag where $\frac{MnO}{FeO} = 2.5$, and he has orders from Moscow to keep FeO on rail and forging steel under 9.0 to 10.0 per cent. He charges manganese ore in his heats and often adds FeMn to the heat to get it "chemically hot" before adding ore to reduce the carbon; and he wants a good boiling action even if he has 1.0 per cent carbon before starting to "work heat"; so, adhering to these principles, he took a good licking on phosphorus until he checked the gas at the time of melt, added burned lime until he got a heavy CaO (45 per cent) in his slag, allowed this slag to lay until it was well fused, showing Fe_2O_3, and then adding ore, again reheating this slag, or allowing it to soak, and getting it fluid only with fluorspar.

The Russian uses bauxite, or clay brick bats, normally. Spar is hard to get, and that which was secured was 25 per cent SiO_2, so it had to be used sparingly. He could, when lucky, get 15 per cent FeO at say 0.65 C, but after boiling this down to 0.55 C, say in ½ to ¾ hr., the manganese would begin to rise in the steel, and the next FeO would be 11 per cent or under. And, if FeMn were added to take the residual from say 0.20 to 0.35, and the boiling process combined for a time, then the FeO would drop to 7 or 8 per cent, and another high phosphorus heat resulted. This also seems to the author to be the answer to a question asked later in the proceedings, on page 229: "How to lower the iron oxide?" A Russian would say, use bauxite ore and clay brick bats, instead of fluorspar, and reboil with manganese. Or, if you wish, get the heat to a high temperature and hold it there until the slag surface is at maximum heat, and then if the slag is heavy, shovel in a liberal dose of river sand.

The question on page 74 of the proceedings, "what effect has the size of mold on rimming qualities of soft steel?" is in a realm as yet neglected in Soviet metallurgy. As noticed, the Russians aren't doing so well in the production of automobiles. The great plant at Nishni Novgorod, which was to have made 120,000 autos of the Ford Model A type per year, is making about 5000. So the demand for deep-drawing, full finished stock is small, and is being supplied from America. However, one shop, in April, 1936, made 42,000 tons of slab, plate, and merchant steel, mostly rimming. The steel was cast into 680x680x2250 mm. molds (27x 27x90 in.), and gave approximately an 8-ton ingot. At 0.10 to 0.12 C, 0.30 to 0.50 Mn, sulphur frequently as low as 0.020, and 0.020 to 0.030 phosphorus, which was residual in most of the soft steel, the ingot grew from 4 in. to 8 in. In the 0.15 to 0.18 C grades, it grew 6 in. to 10 in., but usually rimmed with a strong active boil, forming a pyramid with, say, a 5-in. taper, leaving an opening 17x17 in. at the time the floating crust became troublesome and hindered the boil.

The lower carbon frequently formed a square 12x12 in. before requiring a cap. These heats were made from a low-lime charge, were, in 70 per cent of the cases, heats that melted too soft for rail steel, and were "railroaded" out as soft steel without the least ceremony; for why bother to "baby" this kind of steel? Frequently FeMn (which is plentiful) was used to get them hot. They averaged 10 to 12 per cent FeO and less. They were tapped hot, because, as a rule, the heat was a little bigger than the ladle, and 200 tons through a 1¾-in. manganese nozzle without a slag covering is serious work. They had only the one size of molds, and only 27 of them to a drag. It was a square mold, 6 in. walls at top, 2½ in. taper in the 90 in., and a small corner radius. The paint job was carefully done, always. They found that for this grade of steel that the best rimming action was obtained by pouring with a full

head, right to the time of shutting off, and allowing the ingot to settle back, and then giving a bootleg 4 in. to 8 in.

The Russians also found that a heat with high residual manganese for the last hour of its history was most sluggish. On those heats, a double-handful of ground fire brick, about 40 per cent Al_2, thrown on top of the ingot increased the intensity of the boiling, and, while not preventing the rise of the ingot entirely, it kept the top open much longer than without and decreased the rising about 30 per cent. It was beautiful to see how well this theory of lowering the melting point of these obviously high MnO slags by dilution with a low melting substance worked out. On other heats, where Mn residual had been 0.15 or under, and tapping carbon about 0.15, the slags on top remained liquid, and the addition of the ground clay had no effect. Another noticeable effect of high residual Mn, especially if the metal at time of tapping was hotter than normal, would be the longitudinal corner cracks that would show up at the stripper. The ingots with a low melting slag would not have these, at a reasonable temperature, and there were few or no horizontal cracks at the shipper other than the butt cracks which were probably due to slow pouring.

As the whole behavior of this 0.10 to 0.20 C rimming steel so closely ties in with the observations of Schenck on the question of the influence of Mn on the evolution of CO in rimming steel, the author is very interested to know if the Russians at Zaporoje will have laminated sheets from the bottom areas of their ingots. But, in regard to this question of mold size, the Russian would say, "what of it? Use the mold that will help you most to get the greatest tonnage, not only from your pouring floor, but through your soaking pits and into your slab yard. Then make the steel to fit the mold." At least he would so talk until perhaps he bumps into the continuous sheet-strip mill problem.

The question asked on page 57 of the proceedings, regarding backwall construction would puzzle the average Russian operator. He would be surprised that a question as to which type of backwall is best or cheapest exists. His new 150-ton stationary furnaces all have sloping backwalls, some with welded, others with forged slab binders. Under the severe punishment his furnaces are getting in this great drive for tonnage, the backwall is the only part of the furnace that can "take it." Front walls, roofs and port ends must be made to last as long as the backwall. These latter are the "jobs in hand" with him; for the backwall question is settled. For his 80 per cent iron charge, with incident high foaming, he used considerable grain magnesite for repairing the slag line, and after a cold charge is in, he shovels magnesite and tar across to upper portions of the backwall. Only magnesite brick are used in the construction of this wall, with sheet asbestos between the plate and bricks. Except for door arches, the vertical front walls, 36 in. thick at the slag line, were also magnesite brick, and had more bricks than the back, and took three times the material for fettling and plastering than was required for the backwall, and could not be made to last over 100 heats, because it burned out at the top of the jambs before the arches would fall and destroyed the front skewback.

So the Russian would say in answer to a question about backwalls —"we are satisfied with the sloping backwall—how can we get a sloping front wall that will give such results?" Inasmuch as 2100 deg. to 2200 deg. is the working temperature of the top of the checker chamber, and 1500 deg. is often obtained at the bottom. And, since the chambers are 30 ft. in depth from floor to skew of roof, the strongest system of laying

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TEEMING steel into the ingot molds at Stelin Metallurgical Combinat in Magnitogorsk.

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checker bricks appeals to the Russian. Therefore, he uses the Peterson checker, clay for the bottom half and silica for the top half, and silica for the top half of the walls and the roof of the checker chamber. Even though he has often had the top layers of the checkers collapse, yet he has never found the wreckage below the clay brick level. Therefore he is firmly sold on the T type method of spanning the rider walls, and uses it even in places where he tries the 9x13x2½ in. or 9 in. straights. He was intrigued with what he calls the "cowper" or straight flue checkers, but is veering back to the full Peterson type.

The Russian cannot see a great need for other than manual rationing of air to gas in his situation, unless it would be to install a simple volumetric control. Inasmuch as he operates a fixed-part furnace, and has decided to choke up the end of his hearth and damper down the air discharge flue and pull with 80 mm., or 3 in., draft through the gas part that portion of the waste gas he needs for preheating the gas checkers, a draft control is of no present value to him. True enough, this burns the lining out of the Blaw-Knox port tank in less than 100 heats, but c'est la guerre; they are short, and simply mean a bit more gas goes through, so the rate of heating of checkers is not hanged. The Russian wants, of course, to run the furnace for seven months, as does Wisconsin steel, but he wants 80,000 tons in those seven months from his 150-ton furnace, or 450 heats approximately. From the fixed port he got 205 heats, averaging 160 tons for a record in one shop, and 77 from the Rose port, which failed all three times at seam welds, either because of faulty welding or from broken water couplings. His magnesite brick take an awful punishment in blocks and over ports, but, because of the great length of the furnace, it outlasts the front and roofs.

But grinding mills are scarce. Chrome ore is coarse, and a mass of magnesite and fire clay takes the place of Cr_2O_3 and is a good substitute. Tap hole drilling mechanism would be useful to him, for he rams a tap hole closed with fine grained wet magnesite, which is terribly difficult to remove but never prematurely boils out. Furthermore, those deep baths, and high door banks, prevent him from using a tapping rod, so he just has to tap from behind, and has the sloppiest tapping technique in the world.

Although the average Russian would not be ready to pronounce any last words on the foregoing, he would exhibit a most puzzling positiveness on the question of mold preparation. He would simply say, "we put every mold on the ground as soon as we strip it. Cool it to 300 deg. or 390 deg. F., send a swarm of men on top of it, and scrape, brush and rub to clean the interior of each and every one, and then have the same gang with swabs paint them very carefully with dehydrated tar." That is the prescription for soft steel, forging steel, or bottom-poured Mannesman tube steel. He will tell you graphite causes cracks, and that dipping in water will not clean.

And so, I think, the Russians would answer the questions found in the interesting book, the 1936 proceedings of the open hearth committee. To these Russian engineers it is a vitally interesting publication. I saw it on the desk of the chief engineer of the G.U.M.P. in Moscow, and in the office of Teknika, the foremost technical paper of heavy industry early in November of last year. They would rather lose their libraries of weighty theory by Russian professors, and their tremendously heavy books by thorough painstaking Germans, than to lose this book. They study the way we do it in our book, the way we look at it, and say, "why can't we go about it that way"

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THIS would be a sensation at Gary, for instance. A girl operates one section of the blooming mill at the Stalin Metallurgical Combinat in Magnitogorsk. Picture by Sovfoto.

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THESE door knobs and matching escutcheons are injection molded of Tenite around die cast metal inserts.

Plastics and the Metal Industry

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By HERBERT R. SIMONDS

Vice-President of Metal Products Exhibits, Inc., Rockefeller Center, New York

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METAL hardware may be plastic coated by dipping or by injection molding of plastics over the metal. Both methods may be considered as "metal finishing" since metal forms the base or backbone in each case. Both methods are relatively new and both have vital significance in their relation to the entire metal working industry.

In this article the author has dealt principally with the second method, injection molding, reserving for a later article in this series the rapidly developing process of coating metal with plastics.

Metal fabricators, especially those in the small-article branch of the industry, are cautioned to consider plastics in combination with metal, for, states the author, "Either the metal fabricators must take over plastics and adapt them to their use or the plastics fabricators will take over metals."

This is the third of a series by Mr. Simonds which started with the issue of July 29, 1937.

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DO plastics threaten metals as a construction material? Ask most any metal fabricator and the answer is emphatically no. However, ask some of the enthusiastic plastic molders and the emphatic negative of the metal man loses some of its force.

On a tonnage basis there is of course no serious threat at present from the possible substitution of plastics for metals, but for a multitude of small products plastics, in combination with metals under newly developed fabricating processes, offer a formidable challenge to metals used alone as well as to other materials in combination. Further, due to the design possibilities of plastics and the new importance of appearance in utility products, it seems as if nothing could stop a rapid advance in the use of metals as a strength-aid to plastics or, conversely, in the use of plastics as an appearance-aid to metals.

The threat of this development is not so much to the producers of raw or semi-finished metals as it is to the fabricator. Either the metal fabricators must take over plastics and adapt them to their use or the plastic fabricators will take over metals. The case is somewhat similar to the foundry situation of 10 years ago when castings were threatened by welded rolled shapes. At that time the welding interests felt that castings largely could be supplanted by steel forms,

shaped by flame-cutting and joined by welding. A good many foundries, strenuously opposing such welded construction, went to a lot of trouble to explain why one-piece solid castings or castings joined by bolts were superior. However, there were some progressive foundrymen who foresaw the trend toward combinations of castings and rolled shapes and who immediately set out to conquer the technique of welding and to introduce that method of fabrication into their general production operations. Thus, through a close association of the two basic materials, castings and rolled shapes, arose new economies in manufacture and improvements in design from a functional as well as from an appearance point of view.

The situation today in reference to the threat of plastics, requires the same progressive action. The manufacturer and particularly the producer of relatively small metal articles will do well to consider the combination of plastics and metals in his new designs and perhaps even to consider absorbing in his own total operation an added plastics fabricating process.

Better Fabricating Methods

Every month finds new applications for these two vital materials in dual construction, and where it is evident that a combination of the two gives a product better suited to its purpose than if made in any other known way, it also is evident that eventually such a combination will supersede other materials. Metals and plastics have long been used in combination as for instance in gears made of laminated plastics held together by steel bolts, but it is only recently that metals and plastics have been intimately joined in a single operation either by pressure or injection molding or by extrusion.

In the field of injection molding over metal, the United States which so often has been a leader in developing new fabricating processes has let Australia take first place. Here, as in Great Britain, and Germany, many unsuccessful attempts were made to find a satisfactory process by which cellulose compounds could be molded on metal cores, but, according to one authority, it remained for a Melbourne manufacturer using the American cellulose acetate Tenite to be the first to succeed. Automobile hardware manufactured by Die Casters, Ltd., of Australia, was exhibited recently in this country in the galleries of Metals and Plastics Bureau. Some of the products are shown in accompanying illustrations.

Injection molding is now, however, an established process in this country and it may be well to review some of the operating features.

An accompanying sketch shows a cross-section of the method of injecting the hot plastic material into the mold. The plastic is introduced into the hopper in granular or powder form and is fed into the rear of an injection cylinder. An intermediate pre-heating cylinder increases the supply of heated material and makes it possible to have the proper uniform plasticity at the injection orifice. The injection cylinder itself is heated by a thermostat-controlled electric coil.

The plunger shown at the right forces hot plastic through the mold gate and runners into the mold cavities. The mold itself is cooled by water which is circulated through cooling channels as indicated in the sketch. The operation may be semi-automatic or fully automatic, and it is possible to speed up the sequence to give fairly high production. After the mold has been filled it is opened and the molded product automatically ejected. One action closes the mold and brings the nozzle of the injection cylinder into contact with it. A second action moves the piston in the injection cylinder back and forth.

Design of Mold

The design of mold for injection molding differs from that called for in ordinary compression molding, in that there is no means for the escape of flash. In a single cavity mold the gate usually leads directly to the cavity and in multiple cavity openings it is important to have cavities balanced. A restricted orifice just ahead of the gate is necessary to furnish back pressure and thus break down the granular material into a continuous plastic mass. The cavity entrance in the mold is also made restricted in order to facilitate breaking of the molded piece from the sprue. The operation must be such that the material completely fills the mold before the plastic starts to set. This means that the whole sequence must take place inside of a second. When the process is correctly scheduled the surface of the molded article will have a high, lustrous

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INJECTION molded handles for Studebaker cars, Australian model, with cutaway section.

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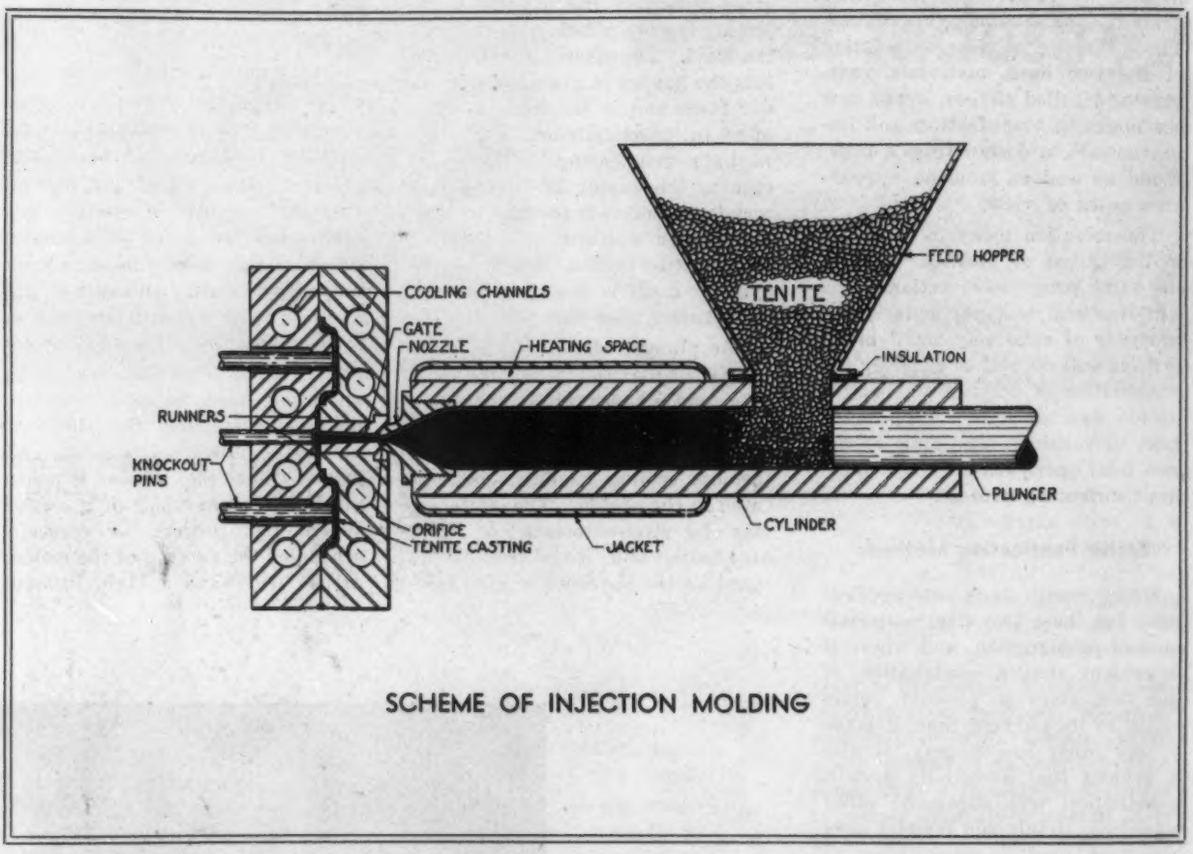
finish and will be complete, ready for shipping except for touching up the small surface where the gate sprue has broken away. The process at present, is restricted to relatively small cavities. An 18-oz. charge is said to be the present limit in this country.

An important consideration in mold design is adequate strength to resist pressure tending to open the mold. If the mold were to be filled with oil or water a 7-ton pressure in the injection cylinder transferred to, let us say, 5 sq. in. of molded cavity area would produce a pressure tending to open the mold of 35 tons. This is not quite the case with the thermoplastic material used. Tests have shown that the pressure tending to open the mold is about half that expected in a hydraulic operation. Control of heat is another important point. Plasticity must be sufficient to quickly fill the cavities at the pressure used but excessive heat creates more pressure on the mold and is apt to give shrink marks. In some actual cases the temperature of the material at the time of injection is 385 deg. F. Normal mold shrinkage is about 0.002 in. per lin. in. The metal inserts are placed as cores in the mold and thus the design must be such as to give points of support. A little ingenuity, however, usually combines this necessity with the functional structure of the parts as may be seen from some of the cross-sections in the illustrations.



SCHEME OF INJECTION MOLDING

Plastics for Hardware

The New Jersey Zinc Co. in describing the automobile handle shown in an accompanying illustration, states: "This is made of a light green cellulose acetate plastic called Tenite. The material is thermoplastic, that is it softens when heated and hardens when cooled. Fabrication is by injection molding, a process somewhat similar to die casting but requiring a lower temperature and higher pressure. As with die casting the mold (or die) is kept cool. The hot plastic is forced into the mold at a pressure of about 20,000 lb. per sq. in."

In the case of U-shaped handles, as shown in another illustration, two zinc-alloy, die-cast, inserts are used. These are positioned on pins in tapped holes into which fastening screws for attachment of the handle are later inserted. This particular handle is one produced for a Stewart-Warner refrigerator and has a plastic coating over the die casting about 1/16 in. thick. The cost of a job of this type is usually more than for a good job of electroplating, but the plastic, being a poor conductor of heat, has a more pleasant feel than the metal for many applications. Also the appearance value may dictate its use even at the higher cost. In describing the appearance of automobile door handles made by molding plastic over a metal core one manufacturer has stated: "They possess exceptional strength and durability and their color may be selected to harmonize with the upholstery. Also the rich luster finish is permanent."

Combinations of metal and plastics are finding a wide use in household equipment. The handles, temperature control knob and bezel in recent refrigerator models are all made of plastics with metal inserts formed by injection molding. The large handles used on the storage drawers have zinc die castings for cores with a layer of plastic about ⅛ in. thick surrounding them. A recent announcement says this is the first time in America that injection molding around large metal cores has been accomplished on a production basis.

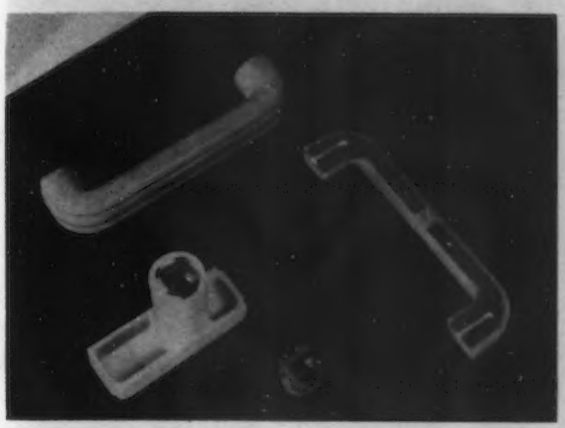
Handles of electrical appliances where heat insulation is desirable may be advantageously designed for injection molding. Business machines, instruments, fishing tackle, clocks, valves, machine tool attachments, cameras, cutlery, razors and countless other products lend themselves to design featuring metals in combination with plastics.

Industrial Design

Those who contemplate adopting this dual construction should prepare their designs in close cooperation with the plastic molding company because there are certain mechanical restrictions. Thus, for best results, inserts should be short and vertically placed although horizontal inserts have been successfully used. Nickel chromium and cadmium are good finishes to use with most plastics particularly in the acetate materials. One difficulty occasionally met in injection molding when the coating is thin is that part of the coating will be pulled away from the insert when the mold is opened and the piece ejected.

In the electrical industry many interesting parts are now being made with metal inserts. To date, this has been largely pressure molding and the inserts in most cases have been screw machine products. Here the design should be such that the metal has a firm support in the base with square or hexagon sections and proper undercut to give added bond. In pressure molding over metal inserts the inserts frequently are first coated with pure rubber to compensate for differences in expansion of the two materials. Many other special features are introduced in the fabrication of electrical parts. Thus, fiber with a high dielectric value is frequently used as an insert to separate switch points.

Small structural members are now being made of plastics with metal stampings imbedded to give greater strength, and this field is one of the most interesting now open for expansion of the plastic industry. A machine part, for instance a brace on a machine assembly, may be molded of a plastic with a metal insert and thus have sufficient strength with added appearance value and reduced weight. These advantages frequently offset



SOMETIMES metal inserts may be used in sections as illustrated in this refrigerator handle.

AUTOMOBILE handles are now being successfully injection molded by the Die Casters, Ltd., of Australia for use in the assembly of American built cars in that country. The section at the top shows the metal casting insert and the method of construction.

the somewhat higher cost and even on the question of actual cost the ingenuity of molding machine manufacturers tends to bring the cost of the composite parts on production work into close competition with the all-metal construction.

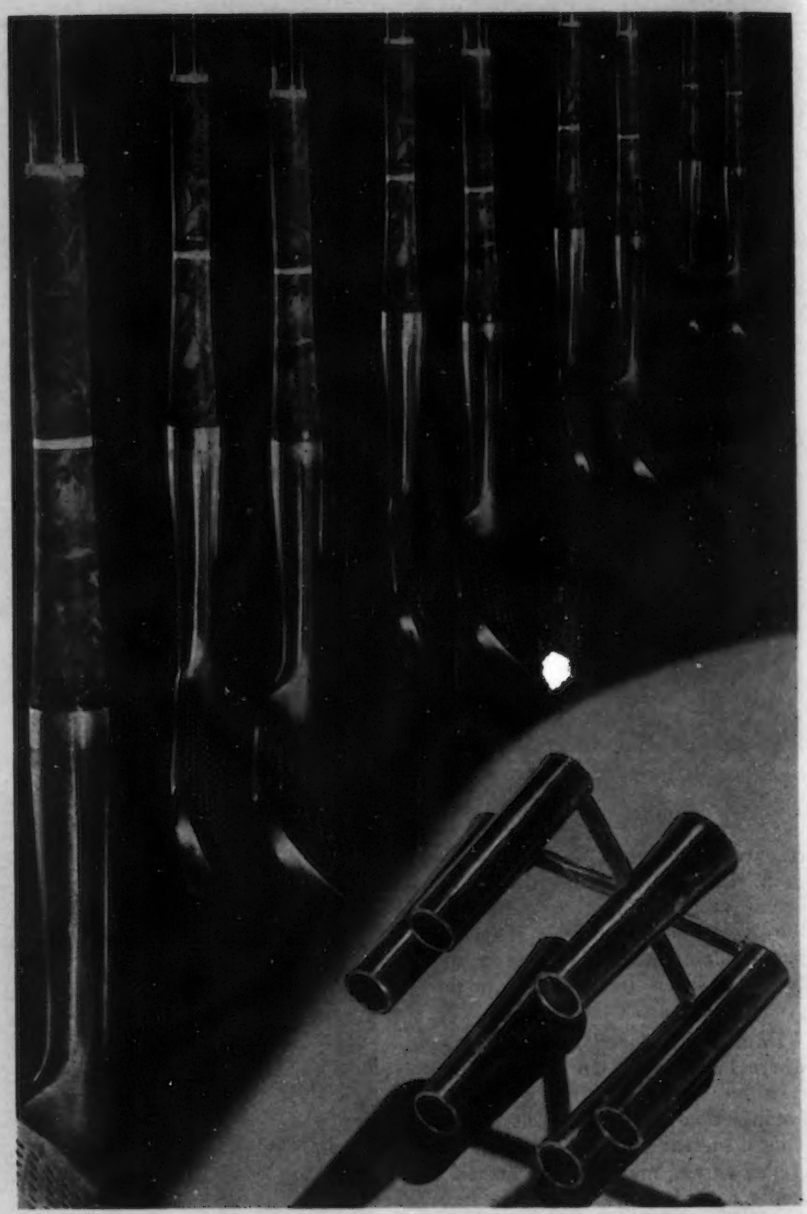
Where the phenolic materials are used, extrusion molding with a metal strip insert may be the solution to many problems. For instance, it appears now that stair railings could be produced in this way for architectural use with the metal insert at the base forming the means of support. The fact that metal inserts may be placed at almost any point in a molded plastic part and that when thus placed they are immovable in the plastic and integral with it, means that designers now have a lightweight material with the fastening strength of threaded metal against threaded metal.

Metal Workers Often Lose

This and other advantages of the two materials in combination are frequently overlooked by the metal fabricator. Thus, it is happening now over and over again that where a stamping is replaced by a molded plastic part with metal inserts the business is taken away from the stamping concern and is handled by the plastic fabricator. As pointed out earlier, there is no basic reason why the opposite procedure should not prevail. That is, the metal fabricator, if quick to see that a combination of plastic and metal might be better than one of his regular metal products, could himself design the new part and have a plastic molder produce it for him, thus being sure of retaining in his own shop the metal portion of the combined piece and also keeping the business within his control. In this way, if demand for the piece in question should warrant, he might develop his own plastic molding department or secure control of a nearby established plastic molding plant. As mentioned, this would be a similar procedure to that which has taken place in the foundry industry. Many a successful foundry today operates a department where rolled steel forms are welded for use in combination with castings.

Die Castings and Plastics

Die castings lend themselves readily to use in combination with plastics either as inserts or in mechanical combination. Also die castings are now being coated with plastics by dipping, much as a lacquer coat would be applied, although usually the plastic coat would be much thicker. The New Jersey Zinc Co. has made an intensive study of the combined use of plastics and die castings and points out that a combination of the two materials gives strength and at the same time a permanent, attractive coloring. The mechanical joining of the two is illustrated by a familiar small handle on a gas stove. In simplest form the plastic is drilled and screwed on to a metal part. Better construction is to have a metal insert in the plastic handle which insert is then tapped and screwed on to the valve shank. For parts such as this, the urea plastics are frequently used. These are molded hot, under high pressure, may be translucent or opaque, are attractive in appearance, and pleasing to the touch for they are poor conductors of heat. In contrast to the urea plastics are the cellulose acetate plastics which are thermo-plastic, a property that makes it possible to use these plastics for injection molding.



FERRULES for golf clubs are injection molded over metal sleeves as shown at the right. These sleeves are later assembled on a metal shaft in forming the complete golf club.

A big potential field is die castings in combination with plastics in the automotive industry. Designers claim that injection molded plastics with metal inserts are destined to replace certain time-honored metal parts in automobile construction as soon as manufacturing facilities can be arranged. Some predict that this change will take place in the 1938 models and certainly by 1939 the changed design should be well introduced if the Australian practice is any indication. Door handles both interior and exterior and window cranks were originally solid nickel and brass. Then these materials gave way to white metal alloy with a chromium plated finish. The next move will probably be a shift to die castings either dip coated with plastics, as one manufacturer is already doing, or covered by injection molding. One authority has pointed out that even on a strictly cost basis some such method of making automobile handles will be warranted. The present automobile door hardware requires a lot of handling, frequently passing through 14 processes from the rough casting to the finished plated part, nearly all of which processes are eliminated in the injection molding job. For certain applications the combination of plastics and metal weighs about one fifth as much as the previous all metal part and also does not tarnish or corrode.

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AT LEFT

A CONVENIENT way of mounting specimens for microscopic examination of surface is here shown. Metal test cylinders are placed as inserts in a suitable plastic material with test surfaces exposed.

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AT RIGHT

BLACK Tenite is molded around metal inserts to form faucet handles in the plant of the American Insulator Corp. The customers in this case were the Republic Brass Co. and the Youngstown Pressed Steel Co.

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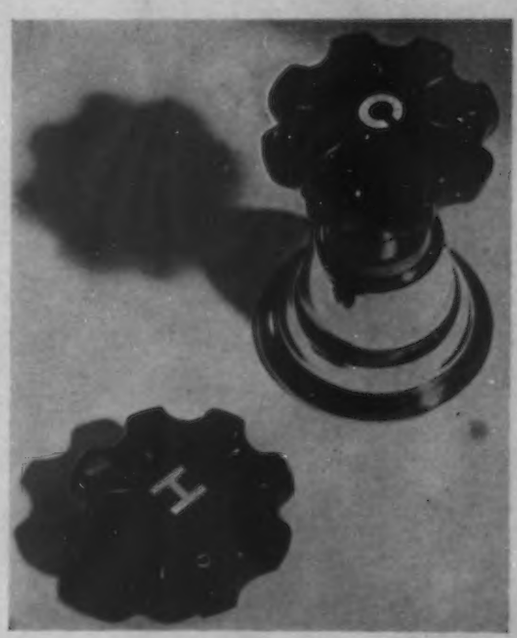
Foreign Practice

Injection molding in many fields has developed more rapidly abroad than here as has been pointed out by J. F. Geers of the Index Machinery Corp. He states that France has been maintaining the lead in the application of injection molding to containers for cosmetics and similar products. Australia probably leads in the injection molding of hardware and English molders are doing a lot of promising work in a widely diversified field.

Europe Leads in Decorative Applications

One of the advantages of injection molding the English find comes through the use of molds with fewer cavities to give the same production as called for in pressure molding. In comparing the development of plastics in this country and abroad Mr. Geers feels that we have developed further in our industrial application and that Europe is in the lead in the artistic and decorative application. "The art of molding," he states, "and the selection of proper application for each method of manufacture justifies the highest respect and consideration of all industry." The general trend even in industrial applications toward design and appearance improvement, is one of the strong factors behind the prediction that plastics and metal in combination will be used more and more in the diversified fields now served by metal fabricators.

Many special applications of metals and plastics in combination have appeared and will continue to appear as the combination technique becomes better known. Samples shown in an illustration offer a convenient method of holding specimens for surface examination. This particular method of mounting is especially suitable for specimens requiring polishing. They could be held of course, in ordinary screw clamps or jigs but when mounted as shown, in a plastic which polishes at about the same rate as the sample, the added convenience can be readily appreciated. The New Jersey Zinc Co., in describing this method for mounting cadmium-zinc eutectic cylinders, points out that it eliminates the danger of including a wrong specimen in a batch of casting metal for re-melting. Also such a mounting as this protects the edges of the samples during polishing. The average laboratory can make these mounts at very little expense. Materials which have been used with success include clear Bakelite XR-3160 and Lucite. These materials mold at moderate temperatures and pressures and may be made on small hydraulic presses with simple equipment.



Pneumatic Tubes Expedite

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By FRANCIS JURASCHEK
Consulting Editor, The Iron Age

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CHAPTER 17 in a comprehensive series on the Economics of Materials Handling Methods and Equipment.

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A FEW years ago the Lamson Co., desiring to find an expressive title for a booklet describing pneumatic tube conveyor systems, finally hit upon the phrase "Wings of Business." This was apt, and the booklet has had a wide circulation; for the question of speeding up written intercommunication between the departments of any business has caused many gray hairs to grow on the executive brow. The bane of an army's existence—"paper work"—is actually a minor evil as compared with the flow of written orders, reports, time sheets and the thousand and one other production records and accountant's forms which necessarily inundate any industrial business. It has been estimated that, on the average throughout American industry, it takes one clerk to keep track of the work of every six factory workers!

This idea is not so difficult to grasp when one considers that every order received by the sales department must be coordinated with the work of at least five other departments; purchasing, to secure materials; production, to get the product made; personnel, to insure the workman's pay; accounting, to record the order, check the costs and bill the customer; and shipping, to move the finished product out of the plant. Any one of these factors may, and usually does require the filling out of several forms, and the transmission of these forms from department to department before, during and after the process of manufacture. Speed and accuracy of transmission of these forms are essentials of that coordination of management which results in efficiency and low costs of operation. Messenger service usually bogs down into settled schedules; regular trips of the messengers from point to point on stated rounds. This means pick-ups and deliveries certainly not oftener than once every hour, and frequently at

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FIG. 2—A Lamson central operator's desk on a tube installation designed for production and time control in an industrial plant.

CONTROL OPERATIONS

longer intervals. In between the visits of the messenger papers accumulate, and when these papers are delivered at their destination, a "rush" memorandum may reach an important executive late, and always there is a mass of papers and forms for the clerks who have to calculate rates and prices, enter items, dictate letters and assemble related data, producing periodical peaks in the operations of control.

Older Methods

I remember seeing boys and girls on roller skates dashing hither and yon in a large New England plant in an effort to speed up the messenger service. It wasn't very satisfactory; especially after workmen's compensation laws were rigidly enforced. And the wire basket running on a trolley suspended from overhead cables has been tried, copied from the old department store systems. This is not particularly good where the distances between departments is great. Today the trend is definitely toward the pneumatic tube conveyor system—rapid, certain, silent and economical. These speedy, quiet, ever-ready messengers, shooting with express-train speed through inconspicuous metal tubes, save time, steps and money. In a concern equipped with pneumatic tubes the paper work is handled fast and without congestion. Written messages of all sorts incidental to the conduct of the business are sent on their way the instant any department is ready to release them, and employees are not deluged with work at one time and out of work at another, as so often happens with periodic human messenger service. Because the tube service is available at every instant, finished work is carried away before it accumulates; before desks are cluttered with the work which follows. Employees need not leave their desks to search for needed papers elsewhere—the tube brings them instantly. A tube system does for the written word what the telephone does for the spoken.

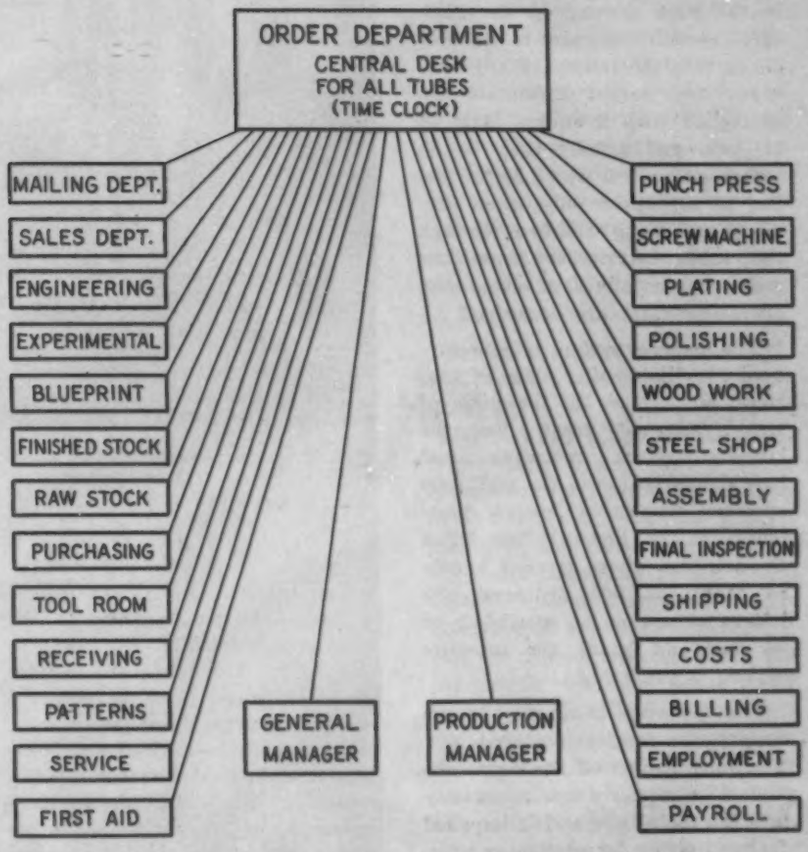


FIG. 1—Schematic diagram of tube intercommunicating system installed for production control in a large metal working plant.

Tube Systems

Pneumatic tube conveyor systems embrace a four part, fixed installation: 1—Metal tubes of circular or oval cross-section, connecting 2—Input-output stations with 3—A central despatcher's desk, and 4—A high-speed turbo fan to furnish the motive power. The moving equipment comprises simple carriers of round or oval shape having a means to secure the contents while in transit, and a heavy felt band around one or both ends which fits fairly snugly the internal diameter of the tubes. These carriers may be made of metal, of fiber, or of leather; they range in size (according to the conveyor system used) from those which will fit into tubes of 1½ to 4 in. diameter round cross-section, or the 3 in. by 6 in. and the 4 in. by 7 in. oval tubes. Lengths of carriers range from about 6 in. to 14 in. and more.

The system may operate by vacuum (suction), by pressure, or by a combination of vacuum and pressure. In all cases the motive power is furnished by a direct-driven turbo fan operating at high speed, moving large volumes of air at low pressure. In the vacuum system, this fan exhausts the air in the tube system; in the pressure system the air is directly blown into the tubes. In any case input and output terminals are controlled with a simple form of air-lock, and usually there is an automatic control which brings the fan to top speed only when carriers are being handled through the tubes. At other times the power is partially shut off so that operating costs are conserved.

The vacuum system is generally used for the smaller sizes of carriers, and where the distances of travel are not great. For the larger carriers, operating over long distances (as in the mail tube systems connecting branch post-offices of the Federal Post Office Department, where carriers handle as many as 500 ordinary size letters at a time at speeds up to 30 miles an hour) the pressure system is preferred.

The operation is simple. In one system, the carrier is placed in a Y-branch leading off the main tube line. The carrier drops by gravity into the main tube and is impelled forward either by suction or pressure due to the fact that the encircling ring of felt on the carrier completely fills the internal diameter of the tube. In another system, the carrier is lightly shoved into an up-tube, the spring-hinged tube flap closes automatically behind it, and the suction pulls the carrier forward. In direct, station-to-station lines, the carrier is discharged through the air-lock at the out-station; or in intercommunicating systems, it is discharged at the central despatcher's desk, where the central operator, glancing at the identification tag or ring on the carrier, shoots it into the proper tube to send it to its destination. In the smaller tube systems the rate of travel ranges between 30 and 40 ft. per sec.; in the larger, underground mail-carrying systems, this speed falls, as noted before, to about 30 miles an hour.

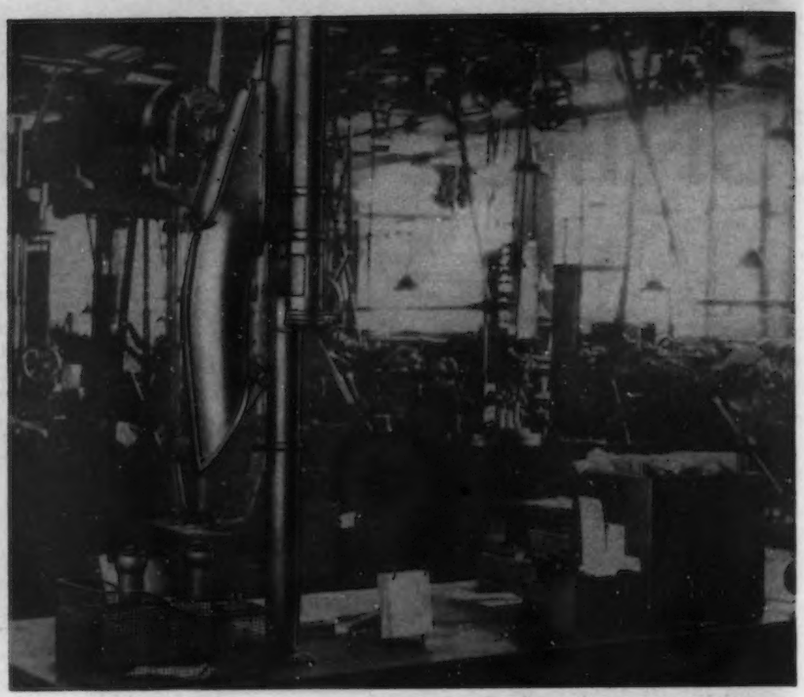


FIG. 3—At the point of contact with the work, a Lamson outstation is located on a foreman's desk, right out on the factory floor.

The largest item of expense of a pneumatic tube system is the tube equipment and the installation costs. The tubes are usually made of brass, must be securely installed, curves must be of easy radius, and in-station and out-station equipment mounted in fixed locations. The cost of the carriers is small in comparison. Motive power, except for the larger sizes of equipment or for large and complicated systems, is not expensive, and maintenance and operating costs are very low. Depreciation is slight and amortization may consequently be spread over 20 years or more.

Principles of Use

Primarily, tube systems are used to increase the efficiency of the "paper work" of an industry or business; centralizing the control of its handling by connecting all departments into one transmission unit regardless of how much space separates them physically. But tube systems are not confined to the transfer of papers. A definite trend in the extension of their use to materials is found in the applications for transferring test samples of a heat of metal to the metallurgical laboratory for immediate analysis, of samples of coal or oil or other materials to the testing laboratories while the stock awaits acceptance, of medicines and X-ray films from central offices to the various departments in a hospital, of cash from a sales counter to a cashier's desk and back in a store, of room keys and small packages from the main office to floor desks in a hotel. In short, tube systems are admirably adapted for the rapid handling of papers or packages or small articles within the capacity of the individual carrier, between any two fixed points; or, through a central despatcher's desk, between any number of points.

In addition to the ordinary transfers of papers and mail from one department to another in an industrial plant, a tube system may be used to facilitate three essentials of management control:

1—*Control of raw materials or of materials in process.* Fortunate, indeed, is the process plant which is able to buy raw materials so uniform in quality that they may be put into process without analysis. Usually most bulk materials must be subjected to laboratory tests before they are unloaded from the cars or ships, and packaged materials kept isolated until the analyses of samples are received. Samples sent from the receiving department to laboratory

and return at express train speed through the pneumatic tubes will frequently save demurrage charges, and limit inventory needs. And goods in process may be the more quickly controlled by laboratory tests made regularly and frequently. Again, speed of transmittal and return of analyses may here mean large savings in production costs due to more adequate control of spoilage.

2—*Control of production time.* A typical time control installation of Lamson tubes with 20 stations is in use in the Meriden, Conn., plant of New Departure Division of General Motors, replacing nine local timekeepers formerly stationed in various departments of manufacturing. The central timekeeper's office is in the main building, and here the central despatcher's desk is located. Lines connect this office with each manufacturing department, and also with the purchasing, receiving, stock and shipping departments. Job operation tickets, initially time-stamped, are issued by the foremen in the various manufacturing departments to the individual workmen, and when the job operation is completed, are sent by tube to the central desk, where they are again time-stamped. At the same time that one job ticket is sent in, a new job ticket is issued to the workman to start his next job. The central timekeeper's office is thus enabled to keep track of the progress of each job, as well as of each operator's time. The method permits early completion of the office detail on each ticket, which is then used to make up payrolls and determine bonuses. Except at peak hours, only one central operator is required, and three girl clerks complete the detail of the incoming tickets. The saving in timekeeper expense paid for the equipment installation in just over one year. A similar 29-station installation has since been made at the Bristol, Conn., plant of the same organization.

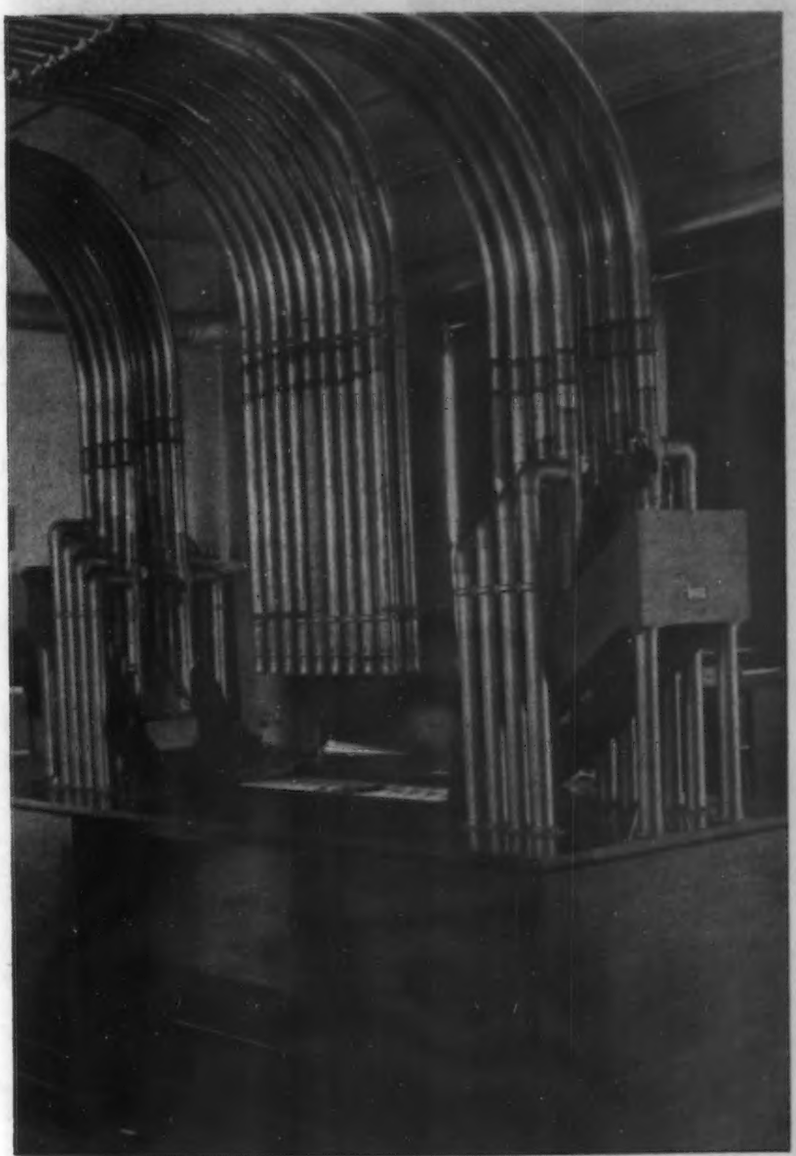


FIG. 4—This Standard Conveyor central tube desk is so designed that four operators may work together during peak periods, or one operator handle it alone.

3—*Order and Production Control.* The accompanying chart (Fig. 1) shows the scheme of an order and production control pneumatic tube system in a large metal-working plant. The central desk ties in all essential departments in the same manner as a telephone central exchange. Each department can communicate instantly with any other department, and the general manager and the production manager keep their fingers on the pulse of the business constantly! not through the spoken word, which may be misunderstood or forgotten, but by the written memoranda, reports, time tickets and routing sheets which provide a clear and excuse-preventing record of operations.

Description of Illustrations

Fig. 2 shows a typical Lamson tube central desk used in connection with a factory production control system. Incoming carriers are shot down to the shelf below, the visible index file cabinets are picked up, opened, the contents time-stamped, the data checked with and entered on the index file, and the necessary notations made on the message itself, which is then put into an empty carrier and shot through the proper up-tube to the station from which it was received, or to the next station in order. There are no delays waiting for messengers to come around to deliver and pick up the papers; and with work constantly coming in and going out, there is

FIG. 5—A Standard Conveyor tube substation in the order department of a large Chicago warehouse. Incoming and outgoing lines are conveniently located.

no accumulation, and no heavy peak load.

Fig. 3 is a typical out-station on a Lamson tube installation; located on a foreman's desk right out on the factory floor. This station is connected with a central desk shown in Fig. 2. From here, at the actual point of contact with the work of production, a memorandum with regard to stock or tools or time or progress, *written* to avoid misunderstanding, is shot to the point of control and instantly noted and acted upon.

In Fig. 4 a somewhat more elaborate control desk is shown, with two banks of down-tubes discharging at either side, and a single bank of up-tubes for despatching in the center. This is the central cashier and credit department nerve-center in the Muller, Inc., department store at Lake Charles, La., but might just as well be located in the central timekeeper's office in any large industrial plant. It is designed to permit two operators to work on either side of the desk during peak periods (four operators in all), or to enable a single operator to handle the traffic in normal times. This installation was made by Standard Conveyor Co.

Fig. 5 shows a Standard Conveyor tube sub-station at the Chicago warehouse of Westinghouse Electric & Mfg. Co. The device which looks like a misshapen question mark is the discharge end of the incoming tube line; out of it the carrier drops to the bin below. The sending tube is in the short, stubby pipe with flanged cover alongside the discharge bend. The actual operation of putting a message into the carrier, buttoning the carrier flap securely, and dropping it into the tube line takes but a fraction of a minute.

Fig. 6 shows a special metal carrier of Lamson make taking a test sample of steel to be sent to the metallurgical laboratory for analysis.

Pneumatic tube systems are not a luxury. Systems which increase the general office speed, eliminate errors, and reduce the payroll simultaneously, are prime investments and an invaluable asset to any business with many departments spread over a large area. The importance of getting more out of each business hour without the risk of verbal misunderstandings, needs no further comment.

(The application of air and steam to the handling of bulk materials through pipes or flexible tubes will be covered by another article in the near future.)

FIG. 6—A special Lamson tube carrier adapted for the handling of test samples of steel between the furnaces and the metallurgical laboratories.

Jovignot's Cupping Test for Sheet Metal

By PAUL BASTIEN

AT a meeting of the Association Francaise des Méthodes d'Essai in 1930, C. Jovignot[1] described a method of testing sheet-metal in which the test-piece is clamped between circular jaws and is subjected to the direct action of a fluid under pressure. Since 1930 this method appears to have received very little attention in France, but it has been made the subject of important investigations at the National Physical Laboratory, London. Mr. Bastien's review of the present situation of Jovignot's work in England is of considerable interest and value. The original article appeared in *Revue de Metallurgie*, Paris, and is reproduced here through the courtesy of *Sheet Metal Industries*, London.

IN proposing a method of cupping by fluid pressure, Jovignot's object was to devise a test for readily determining the coefficient of extension and the breaking load of thin sheet metal, while eliminating the causes of the errors inherent in the cupping methods employing a tool, which will be discussed later.

In the machine perfected by Jovignot (Fig. 1), the sheet to be tested is clamped firmly between two annular jaws by means of a screw press (9, 10, 11 and 14). An oil-filled reservoir (4) below the test-piece communicates with a screw pump (20). Upon applying an increasing pressure by means of this pump, the test-piece assumes the form of a dome. The pressure is indicated by a gage mounted on the pump, and the height of the dome is given by a dial indicator (18), the feeler of which follows all the movements of the top of the cup pressed in the metal. The test is continued until fracture occurs, this stage being indicated by a rapid drop in the pressure and generally also by an escape of oil at the point of fracture.

Also, cupping by oil-pressure may be readily carried out on a Guillery machine (Fig. 2), the tool being replaced by a cup leather held in position by a steel plate and nut tightly screwed on the tool-fixing screw. The small cylinder *c* is filled with oil before the test-piece is placed in position. It is an easy matter to estimate the oil pressure exerted on the test-piece, knowing the pressure indicated by the gage connected to the lower oil reservoir C and the ratio of the radii of the cylinders C and *c*. The deflections of the metal are measured by means of a movement-multiplying device mounted on the head of the machine.

In the course of investigations made in England by Gough and Hankins [2] with a view to ascertaining the advantages of the cupping test method employing fluid pressure, these authors designed a machine by means of which it is possible to test sheet metal thicker than that which can be tested on the Guillery machine. Domes of up to 100 mm. (3.94 in.) in diameter can be obtained, and the complete pressure-deflection diagrams can be recorded. The test-piece *T* (Fig. 3) is clamped firmly in position by screwing down the head *H* of the machine. Oil under pressure enters the chamber *C*, and its pressure is transmitted to the recording apparatus by the pipe *E*. An increase in pressure causes the recording pen *P* to move along the axis of the drum on which the chart is fixed, whilst an increase in the height of the spherical segment causes the drum to be rotated by the flexible transmission *K*.

(1) C. Jovignot, *Rev. Metallurgie*, xxvii, 443-448 (1930), CR. cxc, 1299 (1930).

(2) H. Gough and G. Hankins. Proceedings of the Institute of Automobile Engineers (London), March, 1935, 543-581.

To express the ductility of the metal tested, Jovignot employs a "cupping coefficient" expressing the mean increase in surface of the test-piece per unit surface.

We thus have

$$\text{Cupping coefficient} = \frac{f^2}{r^2} = kf^2,$$

where f = height of cup at the moment of fracture, r = radius of the jaws, and k = a constant.

The stress exerted on the metal at the moment of fracture may be calculated on the assumption that the dome pressed in the metal is spherical and utilizing the formula for a thin spherical shell, when

$$\text{Load at fracture} = R = \frac{P\rho}{2e}$$

where P = pressure of the fluid at the moment of fracture, and e = thickness of the sheet metal.

The radius of curvature ρ of the spherical segment has the value $\frac{r^2 + f^2}{2r}$.

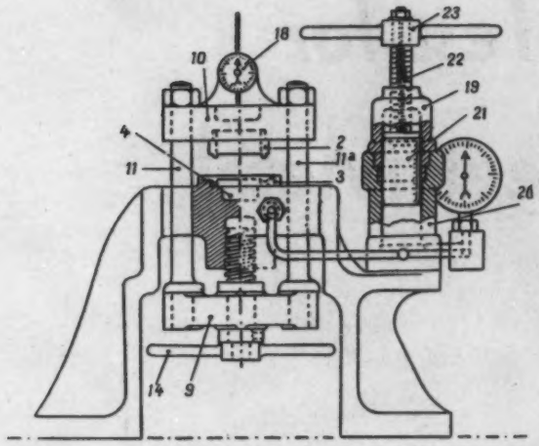
Measurement of P and f at the moment of fracture permits the cupping coefficient $\frac{f^2}{r^2}$ and the breaking load R to be calculated directly. This breaking load may be read directly on a nomogram the construction of which was given by Jovignot in his paper to the Association Française des Méthodes d'Essai in 1930.[1] Since then, R. Vignal found a rather considerable and systematic discrepancy between the calculated values of the breaking load and those read on the above-mentioned nomogram, and in some unpublished work he has constructed new nomograms, the results of which are in satisfactory agreement with those obtained by direct calculation.

Vignal's nomograms are based on the following principle. As has been previously shown:

$$\rho = \frac{r^2 + f^2}{2f} \text{ and } R = \frac{P\rho}{2e}$$

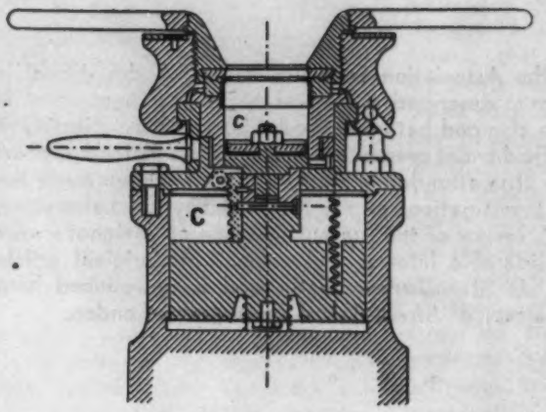
Whence

$$2eR = P\frac{r^2 + f^2}{2f} = t.$$



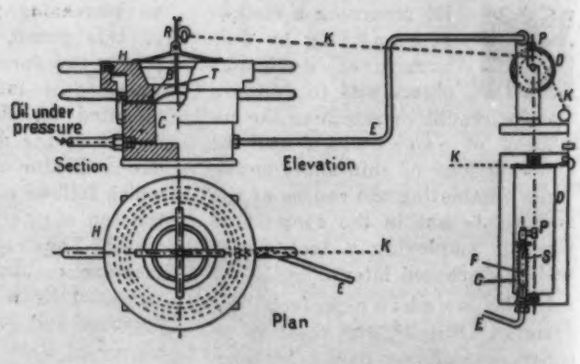
AT LEFT

FIG. 1—Jovignot oil-pressure cupping machine.



AT LEFT

FIG. 2—Guillery machine arranged for oil-pressure cupping tests.



AT RIGHT

FIG. 3—National Physical Laboratory machine for oil-pressure cupping tests.

The four variables are separated and we write either

$$\frac{R}{P} = \frac{\frac{r^2 + f^2}{2f}}{2e} \quad \ldots\ldots (1)$$

or

$$\log 2e + \log R = \log P + \log \frac{r^2 + f^2}{2f} = \log t \quad \ldots\ldots (2)$$

By employing either of these two relationships it is possible to construct several types of nomograms giving R when e, f, and P are known.

First Representation: Two parallel straight lines are graduated logarithmically, one in R and the other in e, which gives the straight pivot line of the scale t (actually this line need not be graduated) parallel to the preceding lines. On a line parallel to the preceding lines the logarithmic scale of P is marked off, and the parallel straight line bearing the scale of $\left(\frac{r^2 + f^2}{2f}\right)$, which is graduated in the deflections f is derived from the line P by means of the pivot line t. Fig. 4 shows the nomogram corresponding to this form of representation for a diameter of the jaws equal to 60 mm. (2.36 in.).

Second Representation: This is effected on the basis of the relationship (1). R and e are marked off in metric graduations on two rectangular axes Ox and Oy, and the group of hyperbolæ $2eR = t$ is derived therefrom. The scale P is marked off on an axis parallel to the abscissæ. By means of the hyperbolæ, the scale of $\frac{r^2 + f^2}{2f}$ is

derived in the form of ordinates which are graduated directly in f. Fig. 5 shows the nomogram corresponding to this method of representation for a diameter of jaws equal to 60 mm. (2.36 in.).

Third Representation: This is derived from the preceding representation, logarithmic scales being used for e and R. The group of hyperbolæ t then becomes a system of parallel straight lines, which is of convenience from the graphical point of view. Fig. 6 shows the nomogram corresponding to this method of representation.

The above-mentioned mathematical relationships and the nomograms derived therefrom are based on the assumption that the dome is a spherical segment. Measurements made by Gough and Hankins on non-fractured domes show that the actual shape of the dome approaches very closely that of a spherical segment. With annealed steel of the 18-8 type, the similarity of the dome with a spherical segment is quite acceptable, despite the considerable pressure required for its deformation. It is possible, however, that with materials of considerable strength and low deformability, the shape of the dome will differ considerably from that of a spherical segment.

Gough and Hankins also investigated the effect which the constraint caused by clamping the test-piece in the circular jaws exerts on the variations in thickness of the tested metal from the edges of the clamping dies to the point of fracture at the top of the dome. The experiments made on brass sheet (Fig. 7) show that the thickness diminishes regularly from the edge of the cup to the top. This influence of the edges shows that a variation, which may not be negligible, is to be expected in the results of a test if pieces of the same thickness are tested with jaws of different diameters. Tests were made on sheet brass, copper, tinned iron, mild steel and aircraft steel with 40, 50 and 60 mm. jaws. (1.47 in., 1.97 in. and 2.36 in.).

The results of the tests are summarized in Table I, and show that the 40-mm. clamping jaw is probably too small, but with the 50-and 60-mm. jaws the influence of the edges becomes less perceptible, since the investigators obtained an almost constant value for the ratio h/r.

Advantages

The cupping coefficient $\frac{f^2}{r^2}$ indicates by its variations the increase in the surface of the test-piece per unit surface. It therefore provides a measure of the ductility of the metal and furnishes information regarding the extensibility of the metal in all directions.

The dome has a simple geometrical shape (spherical segment) and this constitutes one of the great advantages of the fluid-pressure cupping test as compared with the usual methods employing a tool, for which different metals give cups of different shapes.

The use of a fluid under pressure for deforming the test-piece obviates the disadvantages due to the lubrication of the tool, such lubrication being difficult to maintain constant from one test to another. The factor of the coefficient of friction of the metal of the tool against the metal of the test-piece is also eliminated.

The fluid-pressure cupping test permits the deformability of the metal to be determined without employing a test on a perforated test-piece as in the K.W.I. test (5). It is therefore not necessary to take into consideration the influence of the method of piercing the hole and the surface condition of the edge, which, as H. Fournier (4) has shown, may have a considerable influence on the result of the test, and in particular on the cupping elongation (5).

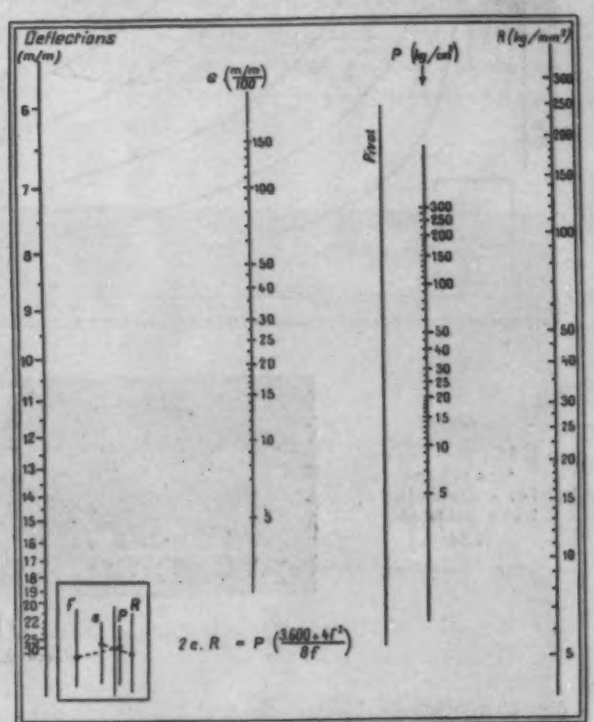
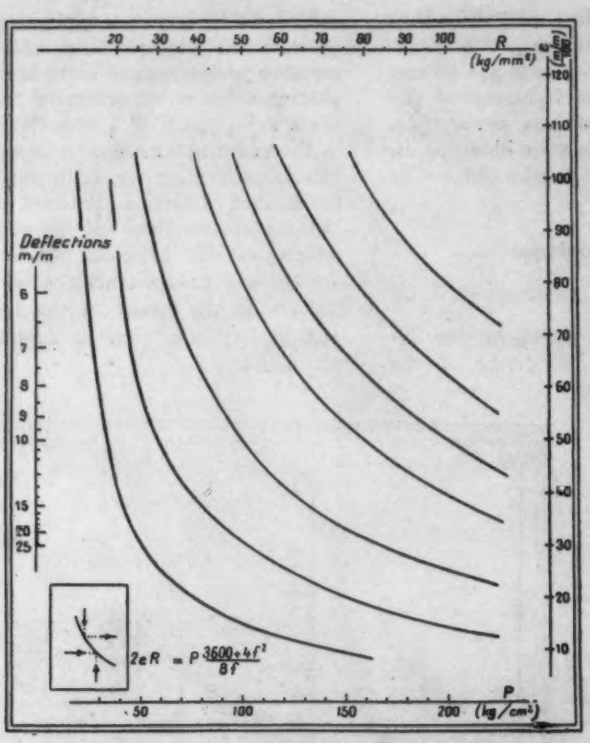
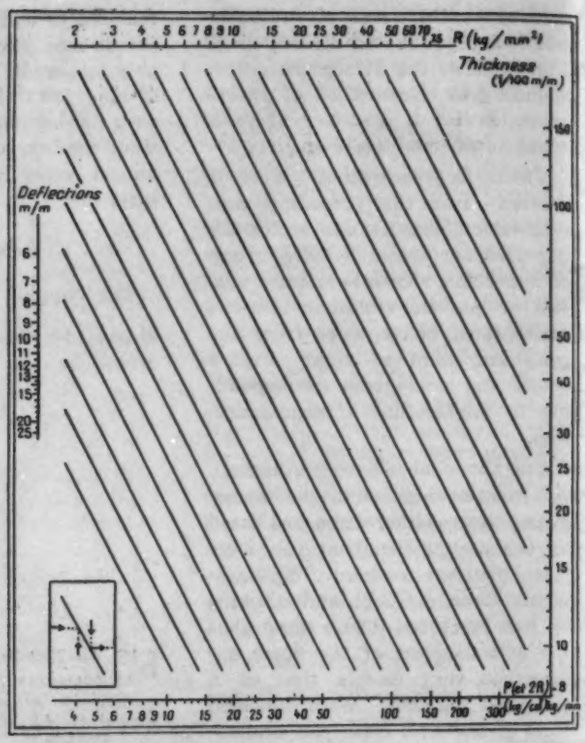


FIG. 4—First type of nomogram for a diameter of jaws equal to 60 mm. (2.36 in.).

The instant of fracture is indicated exactly by a sudden drop in pressure as shown by the pressure gage, and fracture is produced by splitting at or near the top. The shape and direction of the crack provide valuable information regarding the anisotropy of the properties of the metal. In the course of the numerous tests which they made, Gough and Hankins found, as might logically be expected, that a metal which splits continuously in the rolling direction when subjected to the Jovignot test, exhibits a relative weakness in the transverse direction when subjected to a tensile test. Likewise, a metal which exhibits substantially equal strengths in the longitudinal and transverse directions in the tensile test frequently produces lines of fracture which are curved or are inclined relatively to the rolling

(3) Mitteil. Kaiser-Wilhelm Inst. für Eisenforschung, xi, 287-291 (1929).
(4) H. Fournier, Publication Scientifique et Technique du Ministere de l'Air, No. 44, p. 8 and 9 (1934).
(5) The modification produced in the surface condition of the edge of the K.W.I. perforated test-piece to corrosion also has a considerable influence on the value of cupping elongation (P. Bastien, *Chimie et Industrie*, xxxii, 10-20, 1934).





ABOVE

FIG. 5—Second type of nomogram for a diameter of jaws equal to 60 mm. (2.36 in.).

ABOVE

FIG. 6—Third type of nomogram for a diameter of jaws equal to 60 mm. (2.36 in.).

FIG. 7—Jovignot test on sheet brass 0.018 in. thick. Thickness of dome shown in inches.

direction when subjected to the fluid-pressure cupping test.

Criticism

Among the criticisms which may be levelled against the Jovignot test, the two principal ones which come to the mind appear to be the following:

In the vicinity of the jaws in which the test-piece is firmly clamped to make an oil-tight joint, the metal does not participate in the general deformation of the dome, or at least it is only elongated in one direction, whereas the top of the spherical segment is extended in all directions. This is a real objection, but, as previously stated, the experiments made at the N.P.L. appear to show definitely that for diameters of jaws equal to or greater than 50 mm. (1.97 in.), the influence of the edges on the results of the cupping test is negligible.

The criticism may also be made that in the Jovignot test the metal is subjected to a form of deformation which is very different from that carried out in certain pressing or drawing operations, especially in the motor vehicle industry. In this respect, the K.W.I. is said to approach more closely certain types of deformation as carried out in practice. This criticism does not appear to be absolutely decisive, because the K.W.I. test by no means includes all the forms of deformation carried out industrially in pressing or drawing, and since the value of a method of testing depends upon its sensitivity and fidelity, it must be admitted that the fluid-pressure cupping method has the advantage of producing cups of a simple geometric shape, while it obviates the friction on the test-piece during deformation and eliminates the factor of the surface condition of the central hole of the test piece.

TABLE I

The Influence of Jaw Width on Tests of Sheets of Same Thickness

Metal	Thickness	$\frac{h}{r}$ — referred to the value of the $\frac{h}{r}$ ratio for the 50-mm. jaws		
		40	50	60
Copper	0.40 mm.	0.83	1	1.02
Tinned iron	0.45 mm.	0.77	1	0.99
Mild steel	0.60 mm.	0.90	1	1.00

ED. NOTE:—This article will be concluded in an early issue of THE IRON AGE.

Giant Hydraulic Press for Aircraft

THE Douglas Aircraft Co., Inc., Santa Monica, Cal. has installed what is said to be the largest high-speed hydraulic press in the world. This press was built by the Hydraulic Press Mfg. Co., Mount Gilead, Ohio. It is operated by the exclusive H-P-M hydro-power "Fastraverse" system which makes it a completely self-contained press. It has a pressure capacity of 5000 tons. It is used to accomplish several thousand production operations in the shaping and forming of parts for Douglas commercial transports.

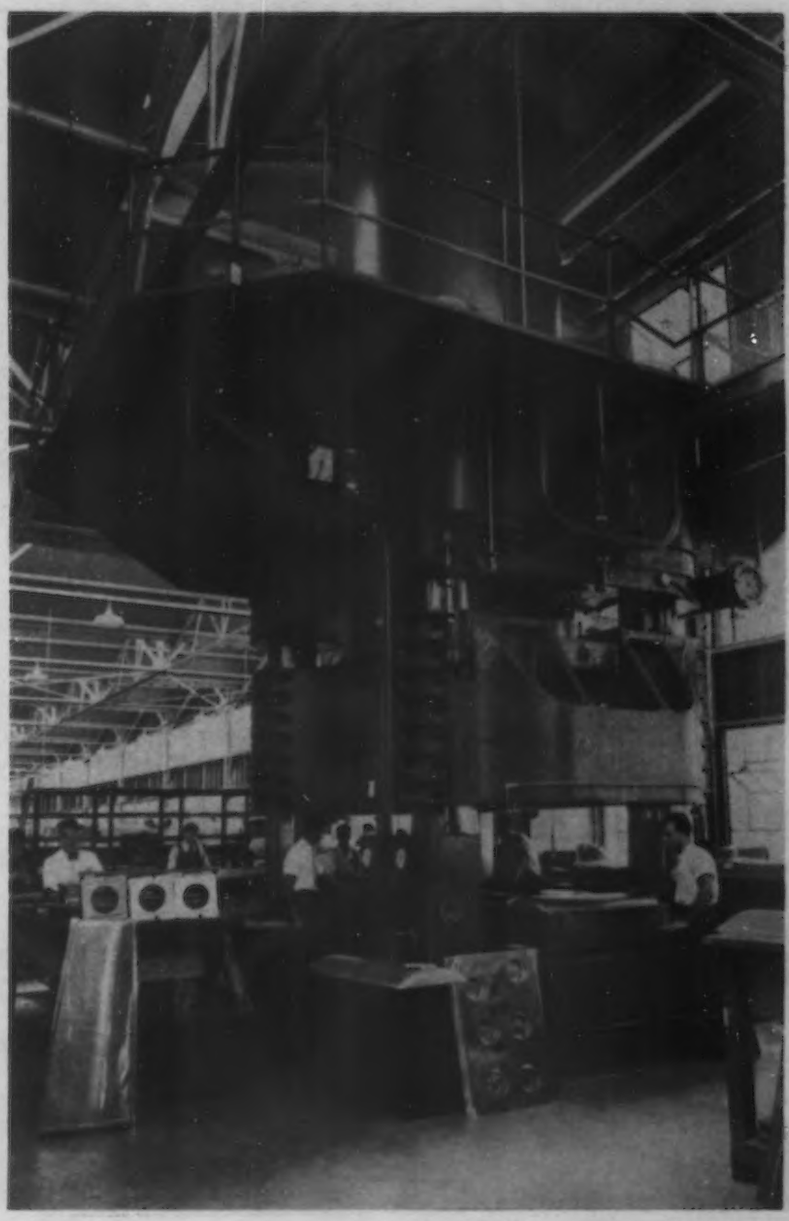
The press itself weighs 840,000 lb. Weights of other individual parts include: head, 175,400 lb.; platen, 110,000 lb.; bed, 141,510 lb.; ram, 42,380 lb.; each strain rod, 28,080 lb. The platen and bed at sides is 8 x 6 ft.; at ends, 5½ x 15½ ft. Maximum opening between platen and bed is approximately 4 ft.

Not only is this a press of huge proportions, but it is also the world's most powerful high-speed press of the modern self-contained hydraulic type. The total pressing force of 10,000,000 lb. is created by a single hydraulic ram 6 ft. in diameter. This is actuated by oil under a pressure of 2500 lb. per sq. in.

This hydraulic pressure is generated by a battery of four large radial pumps of the variable-reversible-delivery type. These are direct driven by two 150-hp. motors.

The hydraulic power from these pumps is directly applied, without intervening valves, to the press rams. The speed and direction of press movements are thus controlled by regulation of the volume and direction of pump output. This makes possible high speed operation with absolute smoothness.

With the thought in mind of applying interchangeability, flexibility and greater manufacturing economy to the fabrication of aircraft parts, Douglas made a test of the possibilities of forming and punching several unrelated aircraft parts at a single setting through the initial installation of a 2000-ton capacity press two years ago. Based on this experience, the large press was bought, and over 3000 parts are now being shaped on the two presses. Tool costs have been reduced as much as 25 to one over conventional tool requirements.



Thread Grinder for Both Production And Tool Room Work

A NEW J&L automatic thread grinding machine for grinding threads in hard or soft material on work up to 8 in. in diameter, when using a 20-in. grinding wheel, has been announced by the Jones & Lamson Machine Co., Springfield, Vt. Work 48 in. long may be held between centers, and 18 in. of thread may be ground anywhere on 36 in. of the work length. Work 11½ in. in diameter may be swung over the work slide and 11½ in. diameter threads may be ground when the wheel is 16½ in. in diameter, or smaller. A 20-in. diameter grinding wheel is furnished as standard, and, as the wheel decreases in size, the proper peripheral speed may be retained through rheostat control of the wheel motor.

The helix angle capacity of the new machine has been increased to include 25 deg. right-hand and 30 deg. left-hand. The helix angle is adjusted or changed by means of a worm and gear.

Standard equipment includes change gears for pitches from 2 to 48, inclusive. The machine will grind single, double, triple, quadruple and sextuple threads, either right or left-hand. Using a simple hardened and ground former, it will grind taper, combination of straight and taper, or double taper threads. Accurate reproduction of taper is assured. The grinding wheel is always at right angles to the axis of the work; therefore no adjustment of thread form is required when changing from straight to taper threads, and the J&L method of grinding taper threads makes lead compensations unnecessary.

The new machine, with the necessary attachments, will grind button type hobs and circular chasers without lead; it will back off, or relieve, straight or taper hobs or taps with either straight or spiral flutes. A standard attachment is obtainable for grinding interrupted threads on straight- or spiral-fluted taps.

A d.c. motor is recommended for driving the grinding wheel. An important feature is the provision made for running all types of grinding wheels at efficient work speeds. This is accomplished by a scale attached to the truing device for recording the wheel diameter at all times and a graduated rheostat with pointer indicating the spindle revolutions. A chart on the wheel-slide shows the surface feet at which the wheel is running, based on the wheel diameter and spindle revolutions. As the wheel is reduced in diameter, the proper speed may be maintained simply by turning the dial on the rheostat. Either a.c. or d.c. motors can be furnished for the wheel truing device, coolant pump and for operating the machine.

It is pointed out that the self-truing, self-sizing mechanism of this machine brings thread grinding into the range of practical shop operations, while being equally suited for tool room work.

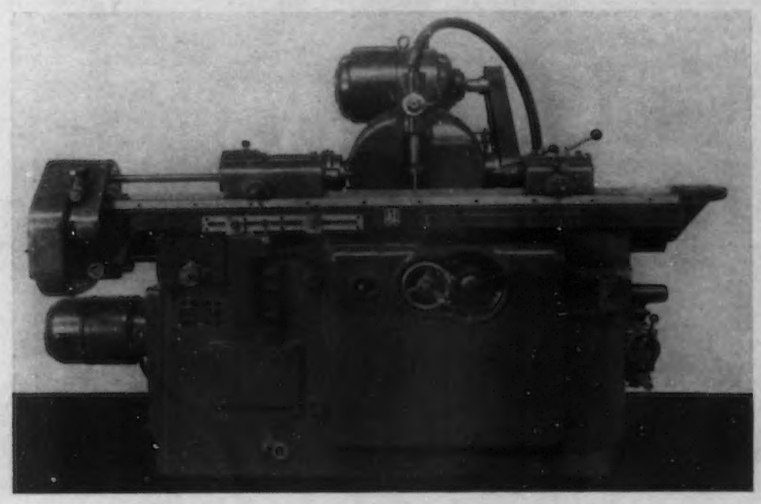
Vertical Pull-Down Hydraulic Broaching Machine

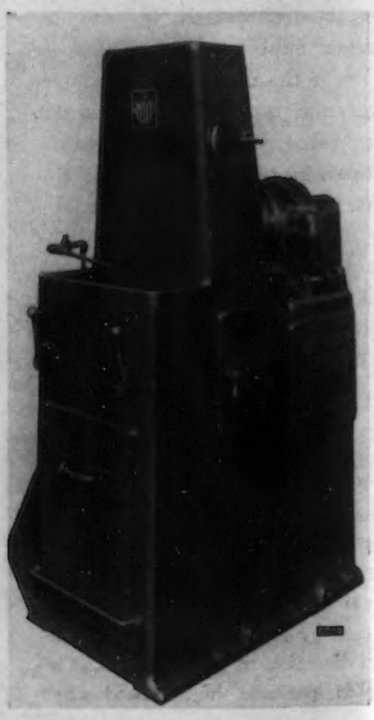
A VERTICAL hydraulic broaching machine of the pull-down type has been designed by the American Broach & Machine Co., Ann Arbor, Mich., for high-speed internal broaching. According to the manufacturer, it is simple in construction, easily set up and can be operated at high speed in perfect safety.

The unit is designed so that the piston and rod are stationary whereas hydraulic cylinder and the ram are the moving members. This design provides a long stroke with relatively low column-height and brings the work support to a position most convenient for easy work-handling. Furthermore, the weight and mass of the moving ram and cylinder are said to promote smooth, uniform cutting. The machined and scraped slide ways of the ram-cylinder bear upon bars of hardened and ground steel secured to the frame at the front and on both sides. Similar bars form caps at the rear of the bearing so that the slide ways are entirely surrounded by hardened steel throughout their travel.

Hydraulic power is supplied by

THE new J & L automatic thread grinder is shown below, and the American pull-down hydraulic broaching machine is at the right.





a Sunstrand unit which is completely submerged in oil in a separate compartment of the base. The hydraulic circuit includes an adjustable safety valve, and is precisely controlled by a specially designed four-way valve.

To operate the machine the worker merely places a work-piece on the pressure plate and passes the broach through the work into the pulling head. He then places his right hand on the operating lever and his left on the safety lever, so that both hands must be free of the work, to cause any movement of the broach. The machine is readily changed from one type of job to another simply by substituting a suitable broach-guide and broach. The stroke-length can be adjusted up to 22 in. upon opening a door in the side of the column. Pressure in the hydraulic circuit is read on a fan-type gage protected by a shut-off cock.

An ample supply of clean coolant is pumped directly to the work from a large reservoir in the base of the machine, which is separated from the chip compartment by a series of baffle plates. Automatic pressure lubrication is provided on the slide ways and pressure lubrication is available on all other bearings.

A standard 5-hp. motor drives the broaching machine through multiple V-belts direct to the shaft of the hydraulic unit. The motor is mounted on an adjustable leaf supported by the housing of the hydraulic equipment.

Builds Vertical Honing Machines With 90-In. Spindle Stroke

WHAT is believed to be the largest vertical honing machine ever built has just been announced by the Barnes Drill Co., Rockford, Ill. Designed to handle hones up to 30 in. diameter, the machine is 31 ft. 4 in. high, and has a vertical spindle stroke of 90 in. The height of the machine is so great that a penthouse had to be constructed in the roof of the main plant to allow clearance for erection and testing the machines, several of which have been built.

A PENT-HOUSE had to be constructed to allow clearance for erection and testing of this large vertical honing machine. This side view shows controls and the ladder provided for convenience in setting stroke stops.

The particular job on which the machine illustrated is working is that of honing a Diesel engine sleeve 17½ in. in diameter bore by 5 ft. long.

Smooth operation, with no shock at either end of the stroke, is a feature. The head reciprocates on ball bearings running on flat tracks in the hardened vertical bars. The large aluminum reciprocating head which carries the bronze driving gear inside together with the spindle and hydraulic piston are supported on the air counterbalance shown with the vertical rods at the top of the machine. This air counterbalance is patented by the Barnes company, and is the same, except for size, as that used on nearly all of the company's vertical honing machines.

The machine affords eight speeds, controlled by three levers. One controls the back gears, while the other two each shift two speeds as on standard transmissions, the shifter forks being operated by means of chain drives from the telescopic tubing and shaft inside. The upper motor for driving the hone is 30 hp. for honing cylinders from 17½ in. to 21 in. in diameter, but larger motors will be used for larger jobs. The lower motor, 15 hp., controls the hydraulic pump system, while a small motor at the bottom of the column handles the flow of cooling fluid, the base containing reservoirs for more than 100 gal.

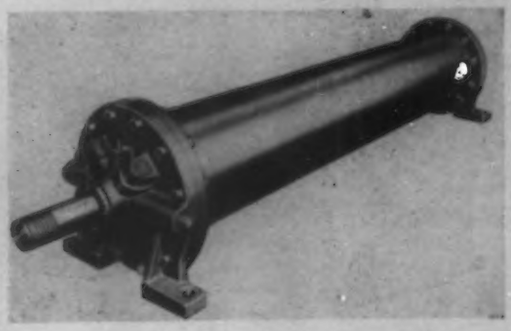
Shorter stroke and shorter column machines are available. Net weight, including hydraulic pump motors, starter and filter is 34,700 lb.

Air Cylinder for Steel Mill Use

AN extra-heavy type of air cylinder featuring precision manufacture has been developed by the Hannifin Mfg. Co., Chicago, for steel mill and other heavy-duty applications.

These cylinders are honed to produce a mirror-finish bore that is straight, round and concentric within 0.001 in. The honing is done by a special long-stroke honing machine designed and built for this purpose in the Hannifin shops. The honing head of this machine operates at a uniform pressure which may be adjusted to suit honing operations on various sizes of cylinders, simplifying the production of accurate, mirror-finish bores.

The flanges of the cylinders are screwed on and then welded to the cylinder body. Heads are of cast



steel and may be secured with or without air cushion at either or both ends.

A full range of standard sizes up to 16 in. bore, for any length stroke and for air pressures up to 250 lb., is being made. The cylinder illustrated is of 16 in. bore and 7 ft. stroke, and was recently delivered to an Eastern steel mill.

Wrapping Type Bending Roll

THE No. 17-AH wrapping type bending roll was designed by Kane & Roach, Inc., Syracuse, N. Y., especially for bending motor frames. The machine, being of the wrapping type, is provided with a separate top, or master roll for each diameter circle. The design is such as to give a complete bend to the end, and a true circle as to diameter. As can be seen in the photograph, Fig. 1, there is a hand operated outer bearing which is counterbalanced and can be flung out of the way when the work is pulled off the upper roll. An air cylinder, operated through conveniently located hand lever control, is provided for raising and lowering the top roll through a toggle joint mechanism.

The drive is taken directly from the motor which is coupled to a worm reduction gear, completely enclosed and mounted on Timken roller bearings. The secondary reduction drive and drive to the top roll shaft are through cut steel gears, suitably guarded.

The machine as designed can handle a range of sections from ¼ in. sq. to 8 in. inside diameter up to 7/16 in. thick by 10⅛ in. face and 11 9/32 in. outside diameter. The machine is operated by a 20-hp., a two-speed motor, 900 and 1800 r.p.m., giving a production of 25 to 50 lineal ft. per min.

Fig. 2 shows adaptation of the machine to special spinning operations on milk cans. The first operation is to iron smooth the inside of the can where the body and breast join and are welded together. The second operation is for caulking or clinching the breast hoop at the edges to form a tight joint with the can body at one edge and the breast at the other edge. The rolls must be changed between the first and second operation.

The machine is very similar in design to the No. 17-AH bending roll except for the special fixture for holding and revolving the milk can and the means for raising and lowering the upper roll. In the second machine a hydraulic system is applied, using a Vickers pump. Furthermore, a link gear drive is employed to the top roll shaft, so that the gears are always in mesh, regardless of whether the top roll is in the open or closed position. A friction clutch with convenient hand lever control is provided.

This particular machine is equipped with a 10-hp. motor for driving the caulking rolls, and a 3-hp. motor for operating the hydraulic pump.

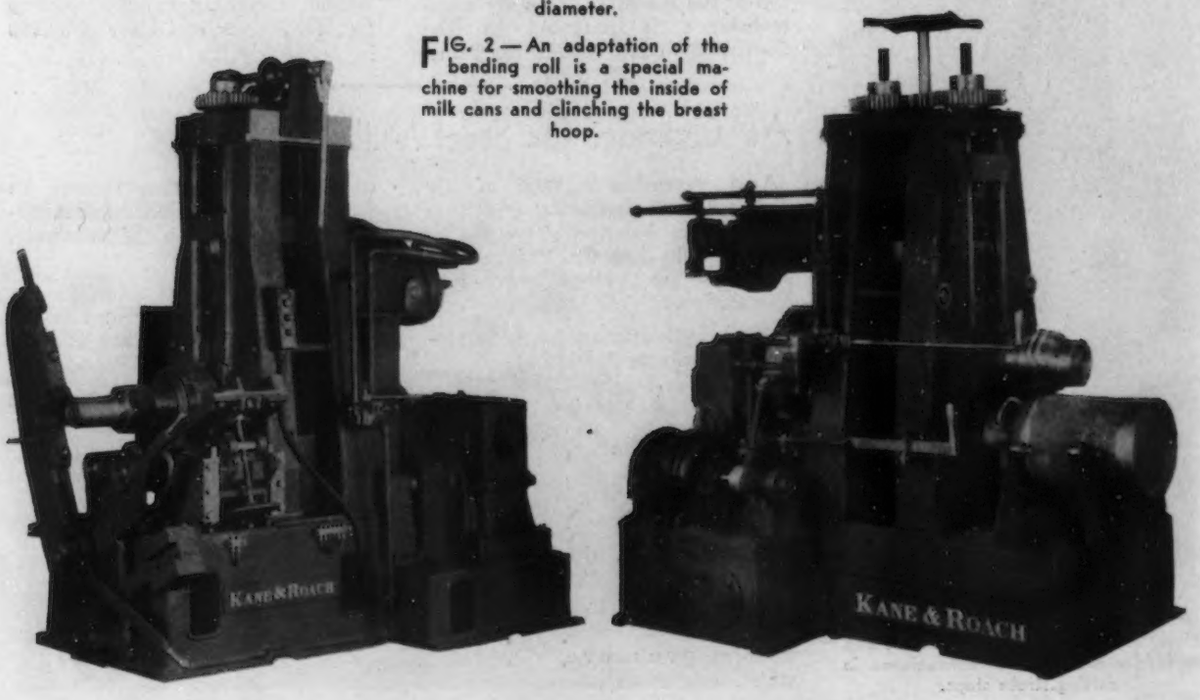
Graduating Machine For Micrometer Dials

A MACHINE for marking micrometer dials and similar machine tool parts up to about 8 in. in diameter or larger is a product of the Noble & Westbrook Mfg. Co., 20 Westbrook Street, East Hartford, Conn. In this unit the work and work spindle are geared to the marking die in order to hold the zero line location as well as to maintain accuracy of the graduations. The marking die itself is mounted on a shaft which can be adjusted laterally. Pressure is applied through a treadle which brings the marking die against the work. Very fine graduation lines can be made, or wide lines, and the lines can be rolled into any desired depth.

A similar model can be supplied for power operation.

FIG. 1 (at left)—This wrapping type bending machine gives a complete bend to the end of the trip and a true circle as to diameter.

FIG. 2—An adaptation of the bending roll is a special machine for smoothing the inside of milk cans and clinching the breast hoop.



FULLER F. BARNES, president, Associated Spring Corp. Drawn by John Frew for The Iron Age.

Multipurpose Hydraulic Universal Grinding Machine

NORTON CO. of Worcester, Mass., announces a completely redesigned model of its multipurpose grinder. This new universal grinding machine is being offered in 14 in. swing and in three lengths of 36, 48 and 72 in. The machine is much heavier than previous models and has many advanced features which make it equally efficient for miscellaneous general production or for the tool room.

Among the features of the machine which add to its versatility and maintenance of accuracy are: hydraulic power work table traverse, a universal wheel head and work head, the latter being so arranged that either live spindle or dead center are instantly available, force feed lubrication of the table ways and a wheel spindle of large proportions, with each bearing individually and automatically lubricated.

The machine is designed for direct motor drive only. Five motors are used, three of which, for the hydraulic oil, lubricating oil and coolant pumps, are built into the machine.

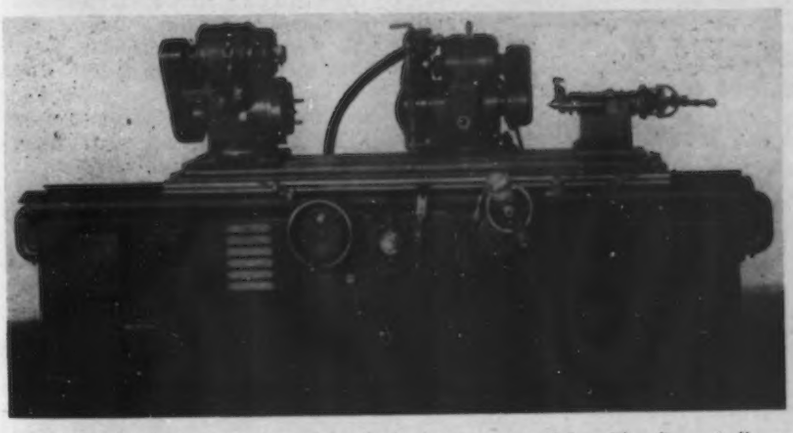
A flat top swivel table is used having a large T-slot its entire length. The swivel adjustment at the right end of the table comprises a screw and nut arrangement providing close adjustment. Scales are graduated to indicate taper in in. per ft., millimeters per 100 mm. and degree of angle.

The universal headstock is mounted on a swivel base and may be turned through the entire 360 deg. The drive is through V-belts from an adjustable speed motor on the headstock. The spindle and drive plate revolve on ball bearings and either live spindle or dead center operation is available. Stopping and starting are controlled by a convenient lever operating a cone-type clutch and friction brake. A clear hole through the spindle permits the use of a draw-in collet, a knock-out bar, or for a water pipe for wet internal grinding.

Work table traverse is by hand-wheel or by hydraulic power. Hydraulic traverse is by means of a cylinder attached to the under side of the table. Oil is delivered through a reversing valve and through the hollow piston rods of which there are two, attached one to each end of the base casting. This method provides smooth table movement with the operating piston rod always in tension. Traverse speeds up to 144 in. per min. are available.

The universal grinding wheel head also rests on a swivel base and compound slide. Wheels for either external or internal grinding may be set at any desired angle. The external and internal grinding wheel spindles are mounted on opposite sides of the wheel head and are driven independently by a single motor having a double shaft extension with direct belt drive to each spindle.

A hand operated grinding wheel feed indexes to 0.0001 in. and also provides for rapid movement. The wheel feed control is operated from the front of the machine regardless of the setting of the wheel slide. The feed may be in the normal direction perpendicular to the table ways or in any angular direction.



UNIVERSAL wheel-head and work-head, the latter arranged for either live spindle or dead center, make this 14-in. hydraulic grinding machine a multipurpose unit.

WITH three-jaw chuck on the work-head, the grinder head is set up for internal work on the piece supported by center rest.

Hatfield Announces New Steel Alloy

LONDON (*Special Correspondence*).—Dr. W. H. Hatfield, famous British metallurgist, announces that, as a result of continuous research and experiment in the Firth-Vickers research laboratory, Sheffield, he has perfected a new alloy steel with unusual properties. The claims for this new steel are such that Dr. Hatfield has applied for a patent in conjunction with J. F. Bridge, secretary of Thomas Firth and John Brown, Ltd.

The new steel contains nickel, chromium, aluminum, vanadium, titanium, manganese, tungsten, and molybdenum.

THIS WEEK ON THE ASSEMBLY LINE

. . . General Motors reopens assembly plant at Regina, Sask., closed since 1930, and plans 125 cars a day.

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. . . Auto production during last week doubles that of year ago, despite holiday and plant shutdowns.

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. . . Detroit employment at high level even during changeover period.

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. . . Cars without running boards seem certainty for 1939.

DETROIT, Sept. 13. — Closed since 1930, the General Motors plant at Regina, Sask., will be opened Nov. 15 to add another 12,000 cars to the yearly production of the corporation. It will assemble Oldsmobiles, Buicks, Pontiacs and Chevrolets. While primarily an assembly plant of the corporation, it will do some manufacturing also. Employing 400 men at the start, it will eventually employ more than 500. Peak production possible in the plant is 125 cars a day and it is anticipated that the additional production will be sold without causing any decrease in the amount of labor used at the Oshawa plant.

Bodies will be built complete, according to the company's announcement, and the paint, welding and trim shops will be similar to the set-up at Oshawa. More than $700,000 will be spent in modernizing the plant before it is reopened. Five buildings are available, with 370,000 sq. ft. of floor space. This Canadian re-expansion is the result of a number of influences. First of all, of course, there is the demand that 70 per cent of the parts assembled into Canadian cars must be of Canadian manufacture. As pointed out in the "Assembly Line" of May 20, American manufacturers are not loath to comply with regulations that would cause them to open plants in Canada. It fits in with the trend toward decentralization and, besides, Canadian labor, even organized, is cheaper than in our automotive centers. With even higher American retail prices coming, the prices of cars manufactured in Canada will be in a relative position that should put many Canadian buyers in the market. Heretofore price has been the bugaboo to big sales in Canada. Another firm that is even now ready to begin more production across the border is Chrysler, with its new Windsor engine plant.

The No-Sag Spring Co., Detroit, has leased a plant in Windsor and will begin manufacturing operations there this month for the Canadian and British trade. Part of the machinery is still to be moved in, but when production gets under way the company will supply not only furniture manufacturers but also automobile builders in Canada. In this country the Murray Corp. holds the rights to the "No-Sag" type spring (a flat spring instead of a coil) for automotive use.

Plant Expansion Continues

Plant expansions continue to be important news. Projects still being incubated are a new Ford assembly plant in Missouri and a new Dodge plant near the Chevrolet plant at Tonawanda, just outside Buffalo. In the latter case, it is understood that property negotiations are well along toward completion. Suppliers of structural steel are anxiously awaiting official word that Ford will erect a huge press plant, obviously to build bodies now being produced at Briggs. They have already bid on steel for the two new open hearths at Ford, a new hot mill and the Milford carburetor plant. Contracts have already been let for the Inland Mfg. Division plant of General Motors near Cranford, N. J. A new building to house a press shop, machine shop and paint shop, together with final inspection facilities and a loading dock, is to be erected soon by the Fruehauf Trailer Co. A building with 6400 sq. ft. of floor space will be erected just north of the present structure

on the east side of Detroit, where 325,000 sq. ft. is now available.

Despite rumors which have it that Chrysler will put out a new low-priced car, to be named after K. T. Keller, president, every available indication supports the word of Chrysler people that no such car is contemplated. It can be taken for granted that all of the automobile companies have such small cars running around on proving grounds. The one at General Motors is practically a replica of the Opel, which General Motors builds in Germany. Of course "horseback opinion" finds plenty in the success of Willys and the Ford 60 to justify other small cars.

Large-scale steel manufacturing operations have been begun in the mills of the former Newton Steel Co. at Monroe, Mich. The plant will be known hereafter as the Monroe plant of the Republic Steel Corp., which acquired title to the property through auction recently. The plant, which has been closed since Aug. 17 for inventory, will provide employment for 1300 to 1500 workers.

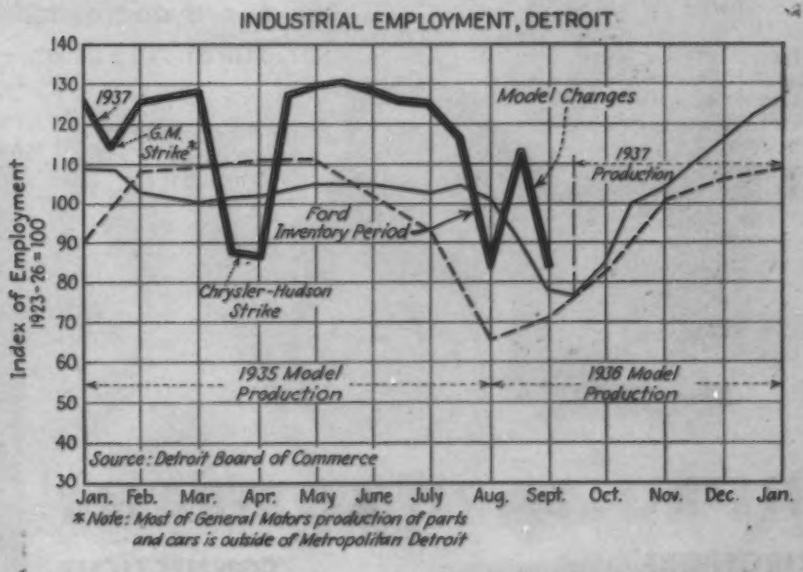
A foundry addition for the Sealed Power Corp. at Muskegon is to be started immediately and a new warehouse and stockrooms are to be built, supplementing new construction just completed. According to C. E. Johnson, president of the company, sales of piston rings and pistons for the first eight months of 1937 exceeded those for any corresponding period in the company's 25-year history. It is the supplier to 12 automobile companies that manufacture more than 80 per cent of all cars sold in the United States.

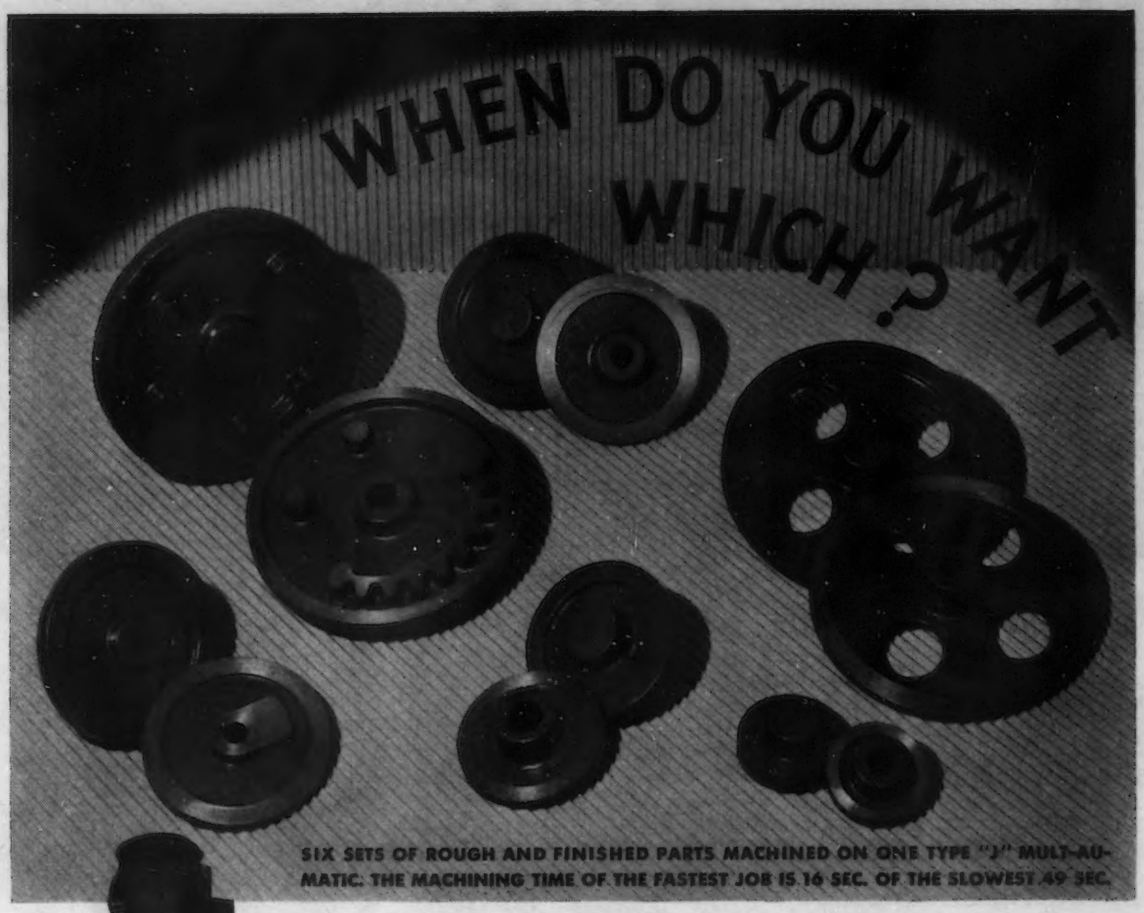
Automobile production last week was more than double that of the corresponding week a year ago, despite the loss of one working day last Monday. The figures are 59,017 and 27,619, respectively. One week ago Ward's Automotive Reports gave the total as 64,200 passenger cars and trucks for the United States and Canada. Ford was the one big factor in production last week, although five other plants started operations on 1938 models. The reopened units served to counteract the effect of low production at factories which are on the verge of closing and the effect of the one-day holiday.

Packard last week joined the new model parade started the week previous by Studebaker. Next week shut-downs at factories completing 1937 assemblies will be counterbalanced in large part by resumption at other plants. Total volume, however, will continue to point downward for at least one more week.

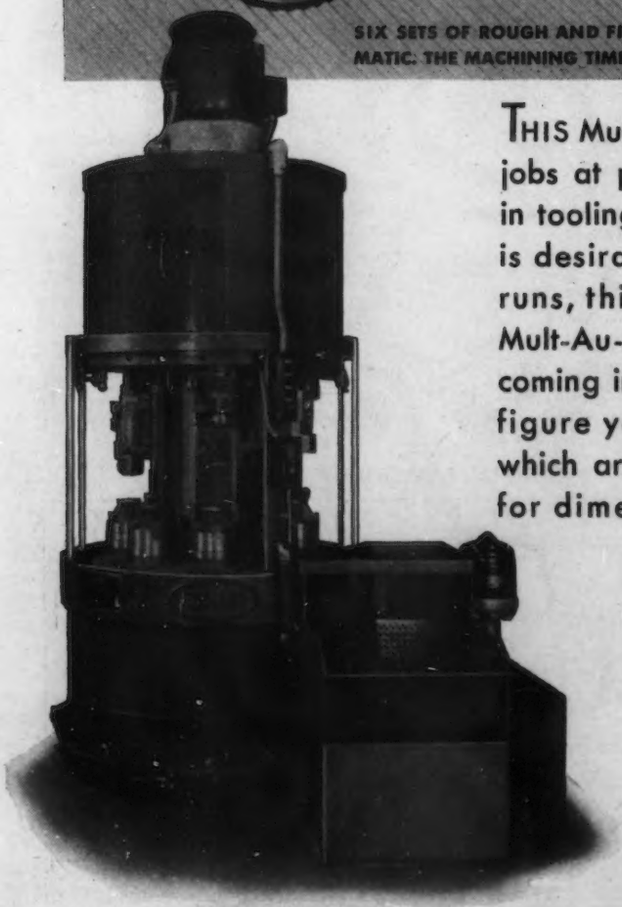
The continued high production is indicative of a corresponding demand for cars, even for 1937 models, in large part because of the price raises currently in effect and still to come. However, sales are slowing up now, it is reported.

Ward's service reports some evidence of a breakdown in the price structure as the last weeks of the model year pass. Excessive trade-in allowances are noted in various localities, where dealers fear that they are overloaded on 1937 stocks. Opinion varies as to the probable effect, one school holding that the introduction of new models will cause used car prices to drop a peg, while others believe that conditions may serve to spur the used car market and start an upswing

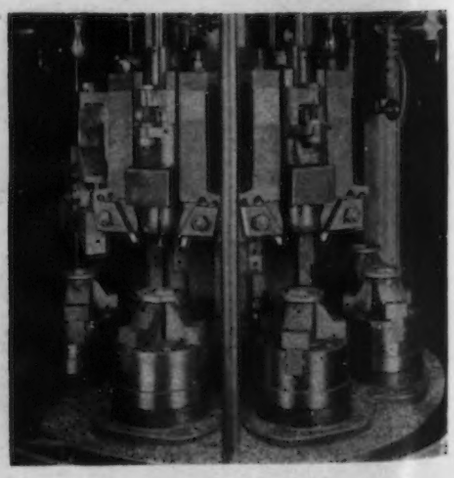




SIX SETS OF ROUGH AND FINISHED PARTS MACHINED ON ONE TYPE "J" MULT-AU-MATIC. THE MACHINING TIME OF THE FASTEST JOB IS 16 SEC. OF THE SLOWEST 49 SEC.



THIS Mult-Au-Matic is tooled to do several different jobs at periodic intervals with only slight changes in tooling set-up . . . However, if for any reason it is desirable to change the sequence of schedule runs, this may be done simply and quickly . . . Mult-Au-Matic tooling to meet such conditions is becoming increasingly popular. Let Bullard Engineers figure your jobs for Series Runs . . . those jobs which are approximately the same design except for dimensional or slight contour differences.



THE BULLARD COMPANY

BRIDGEPORT **CONNECTICUT**

in prices which would be in keeping with general increases in commodity prices. The first figures available in complete form on August sales are those of General Motors, which has sold 188,010 cars in the United States and Canada, together with shipments overseas, compared with 121,943 in August last year. Sales in July this year were 226,681. In the first eight months of 1937 the total was 1,512,061, compared with 1,496,804 for the same period of 1936. William E. Holler, Chevrolet's general sales manager, regards large volume in the truck and commercial car field as especially significant. In August, Chevrolet sold 22,120 trucks. This is the second highest August truck sales figure in the history of Chevrolet.

"Substantial truck volume such as this is important not only for its own sake, but also as an indication of the country's ability to buy—a factor which will make itself felt during the coming months," Mr. Holler said. "It shows that two large truck markets, the replacement market and the expansion market, will both account for the increasing volume during the period just ahead."

In terms of Detroit's employment as a whole, the continued high automobile production has meant a generally higher level of employment. The accompanying chart has low points on Aug. 1 and Sept. 1, but these were purely the result of individual shops closing, such as the Ford inventory period, and the other automotive shutdowns. During the middle of August the index rose, and at the present time it is rising again.

Now that new models are being shown to the press and in some cases to heads of the dealer organizations of the automobile factories, it is possible to check up on the results of the last year's engineering work. For the most part, the policy has been to keep pretty close to the lines laid down a year ago. An outstanding exception, and one of the few, is Graham. It is impossible to picture this car so early, but certainly it is saying enough to report that the late Amos Northrup, genius behind the Willys lines, is said to be responsible for the Graham creation. Hupmobile is using every facility to get enough cars built so it can show them to the public, which will find the car pleasing but not at all radical in appearance. The same can be said for Studebaker, along with the fact that the latter organization has made some changes in transmission control that make it possible to turn the gear box on its side, leaving the front floor board completely flat. The Bantam car, as yet to be displayed, will go into production before long under the supervision of Walter and Clarence Fishleigh, two noted Detroit consulting engineers who have been assisting with production plans. The American Bantam Co. has recently placed an order with Corcoran-Brown, Cincinnati, for a specially designed headlamp.

It can be said with certainty that six or more of the 1939 automobiles, that is, those that will make an appearance a year from now, will come out sans running boards. One of the parent corporations has virtually decreed this change in style for engineering staffs to work on in the next 12 months. That, of course, is a pretty good indication that others of the score or more of automobile manufacturers will follow the trend. From the viewpoint of appearance, body width, seating capacity, comfort and streamlining, this will probably be the outstanding thing to look for in the models which now are on paper. Another problem which will receive more than passing attention as engineering minds are turned toward another year's work is safer headlighting, which is the objective of a new program launched jointly by member companies of the Automobile Manufacturers' Association.

Labor activity in Detroit following the first Labor Day parade since 1916 consists principally of the UAW negotiations with General Motors and the threat of a strike against the Detroit City Gas Co., which would tie up that utility and affect industry as a whole, as well as householders.

The union and General Motors resumed negotiations the first of last week, still trying to find a formula which would be a guarantee against unauthorized strikes. Daily sessions have been held in utmost secrecy and not even the union, usually voluble, gives a clue as to the progress that has been made. Both sides admit, however, that they have not reached the main part of the negotiations, but are still in the preliminary stages, although weeks were devoted to that before the union convention.

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NEW model coming out—In 1912, on West Grand Boulevard in Detroit, the first Chevrolet rolled off an "assembly line" just about like this. Since then more than 13,000,000 cars bearing that name have been put on the road and the plants will re-open Monday to start production on 1938 models. This picture is exclusive to THE IRON AGE.

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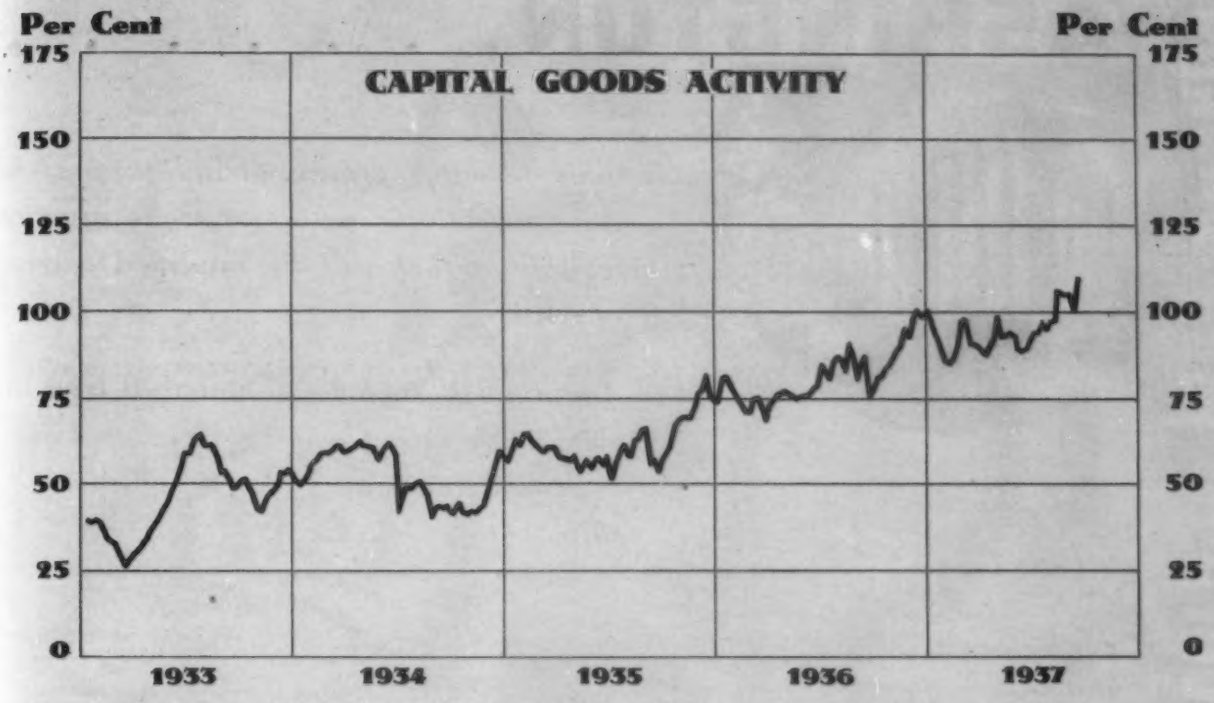
Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available. Boldface Type Indicates Changes This Week

	July 1937	June 1937	July 1936	Seven Months 1936	Seven Months 1937
Raw Materials:					
Lake ore consumption (gross tons)[a]	5,236,487	4,639,733	3,826,050	23,123,350	34,610,446
Coke production (net tons)[b]	4,707,106	4,298,559	3,827,400*	25,113,000*	32,226,934
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	3,498,858	3,107,506	2,594,268	16,122,494	23,205,451
Pig iron output—daily (gross tons)[c]	112,866	103,584	83,686	75,692	109,460
Castings:					
Malleable castings—production (net tons)[d]	45,479	54,026	44,413	318,505	397,334
Malleable castings—orders (net tons)[d]	41,353	43,141	41,031	306,086	376,211
Steel castings—production (net tons)[d]	86,978	101,239	78,654	420,236	683,539
Steel castings—orders (net tons)[d]	57,799	71,817	74,001	497,555	666,707
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	4,556,596	4,183,762	3,914,370	25,190,467	33,321,229
Steel ingot production—weekly average (gross tons)[e]	1,030,904	975,236	885,604	827,817	1,100,074
Steel ingot production—per cent of capacity[e]	78.49	74.46	67.61	63.20	83.75
Finished Steel:					
Trackwork shipments (net tons)[e]	8,252	9,194	6,216	40,808	62,260
Fabricated shape orders (net tons)[g]	160,970	175,552*	199,057*	961,033*	1,079,769
Fabricated shape shipments (net tons)[g]	144,560	147,618*	155,124*	847,368*	924,616
Fabricated plate orders (net tons)[d]	26,854	34,833	60,324	291,731*	278,099
U. S. Steel Corpn. shipments (tons)[h]	1,186,752	1,268,550	950,851	5,982,201	8,801,026
Ohio River steel shipments (net tons)[i]	163,705	147,100	110,495	576,116	821,395
Fabricated Products:					
Automobile production, U. S. and Canada[k]	456,775	521,139	451,206	3,045,714	3,374,195
Construction contracts, 37 Eastern States[l]	$321,602,700	$317,842,100	$294,734,500	$1,532,075,300	$1,815,253,900
Steel barrel shipments (number)[d]	715,014	929,536	749,415*	4,652,131*	6,041,341
Steel furniture shipments (dollars)[d]	$2,071,417	$2,183,481	$1,510,716	$10,722,134	$15,781,603
Steel boiler orders (sq. ft.)[d]	979,316	719,008	1,109,952*	5,760,557*	6,432,625
Locomotive orders (number)[m]	3	22	9	131	231
Freight car orders (number)[m]	1,030	528	4,469	31,023	46,120
Machine tool index[n]	171.1	191.8	150.1	†132.6	†190.5
Foundry equipment index[o]	204.0	228.2	159.6	†155.4	†224.7
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	47,012	44,771	47,940	367,085	345,526
Imports of pig iron (gross tons)[p]	8,310	7,541	12,496	110,003	68,175
Imports of all rolled steel (gross tons)[p]	26,116	24,656	19,801	143,715	199,792
Total iron and steel exports (gross tons)[p]	889,438	826,578	295,878	1,922,543	4,432,131
Exports of all rolled steel (gross tons)[p]	285,782	195,676	93,423	626,924	1,307,905
Exports of finished steel (gross tons)[p]	224,121	163,689	83,612	570,937	1,119,226
Exports of scrap (gross tons)[p]	420,097	514,651	192,817	1,238,243	2,554,862
British Production:					
British pig iron production (gross tons)[r]	729,300	699,300	665,600	4,414,700	4,740,300
British steel ingot production (gross tons)[r]	1,059,200	1,106,400	974,100	6,718,300	7,397,600
Non-Ferrous Metals:					
Lead production (net tons)[s]	45,496	40,156	39,576	263,591	299,630
Lead shipments (net tons)[s]	47,727	42,710	38,996	254,733	360,367
Zinc production (net tons)[t]	49,181	50,526	45,481	299,213	329,771
Zinc shipments (net tons)[t]	49,701	50,219	41,819	294,306	369,165
Deliveries of tin (gross tons)[v]	4,980	6,645	7,120	44,140	49,415
Copper production, refined (net tons)[w]	79,611	86,016	53,985	410,165	567,076

† Three months' average. * Revised.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [g] American Institute of Steel Construction; [h] United States Steel Corp.; [i] United States Engineer, Pittsburgh; [k] When preliminary from Automobile Manufacturers Association—Final figures from Bureau of Census. [l] F. W. Dodge Corp.; [m] *Railway Age;* [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange; [w] Copper Institute.



The Iron Age Weekly Index of Capital Goods Activity

(1925-27 = 100)

Last week	110.0	Same week 1934	43.4
Preceding week	100.0	Same week 1933	51.6
Same week last month	106.0	Same week 1932	31.9
Same week 1936	84.3	Same week 1931	54.0
Same week 1935	55.9	Same week 1930	80.7
Same week 1929	115.3		

THE mixed influences of the holiday week on the five components of THE IRON AGE seasonally adjusted index of capital goods activity is reflected in a rise of 10 points to 110 for the week ended Sept. 11. Total automobile assemblies for the week were lower than in the preceding week, but when this figure is broken down to a daily average and the short holiday week is taken into consideration, a gain of 1590 cars per day over the week ended Sept. 4 is indicated. This increase in daily production was further emphasized when adjusted against a seasonably declining trend and was primarily responsible for the rise in the composite index. Against-the-season gains in river shipments out of Pittsburgh were offset by losses in the indices of steel production, lumber shipments and construction awards.

	Latest Week	Change from Preceding Week
Steel production (per cent of capacity)	70.0	—13.0
Automobile production (number of cars and trucks)	59,017	—5,183
Railroad loadings of forest products (number of cars)	37,498	—930
Pittsburgh industrial production and shipments (index number)	106.3	+1.8
Construction contracts awarded (total value)	$36,868,000	—$4,757,000

Components of The Index (1) Steel Ingot Production Rate, from THE IRON AGE; (2) Automobile Production, from Ward's Automotive Reports; (3) Revenue Freight Carloadings of Forest Products, from Association of American Railroads; (4) Industrial Productive Activity in Pittsburgh District, from Bureau of Business Research of University of Pittsburgh; (5) Heavy Construction Contract Awards, from *Engineering News-Record*.

WASHINGTON. . . . . .

. . Some business groups giving support to Administration's move for trade practice legislation that will be modified revival of NRA.

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. . . Adoption of such legislation will lead inevitably to more Government control over industry, smacking of European dictatorship.

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By L. W. MOFFETT

Resident Washington Editor
The Iron Age

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WASHINGTON, Sept. 14.—Considerable support is being given by some business groups, it is reported, for trade practice legislation. Such legislation at the next session of Congress is said to be contemplated by the Administration. Tied in with the wage-hour legislation, though by a separate act, the country may again see the Blue Eagle fluttering over industry. No matter that the miserable old bird had become a drooling capon before its agonizing shrieks were stilled by the Supreme Court and that it will repeat itself attempts are being pushed to renew the experiment. Streamlining of the fowl, so it is said, will be somewhat different from the old NRA model. For one thing codes will be missing. There are the usual honeyed words about "cooperation" between Government and industry to set up utopian rule of business conduct. But under the veneer of sweetness lies the rancid meat of ever-growing bureaucratic rule.

This wild growth of centralization of Federal power under the New Deal, it would seem, may be likened to Alexander Pope's idea of vice, which, allowing for the liberty of off-hand quotation, he described as a monster of such frightful mien that to be hated needs only to be seen. So it is with regimentation, the taking of the nation's economic, labor, financial, agricultural and industrial bodies, and lockstepping them, link by link, into a vast chain of galling political control. A great, sprawling, blundering, tax-eating, patronage-sodden bureaucracy of Fascism or Communism, as you will.

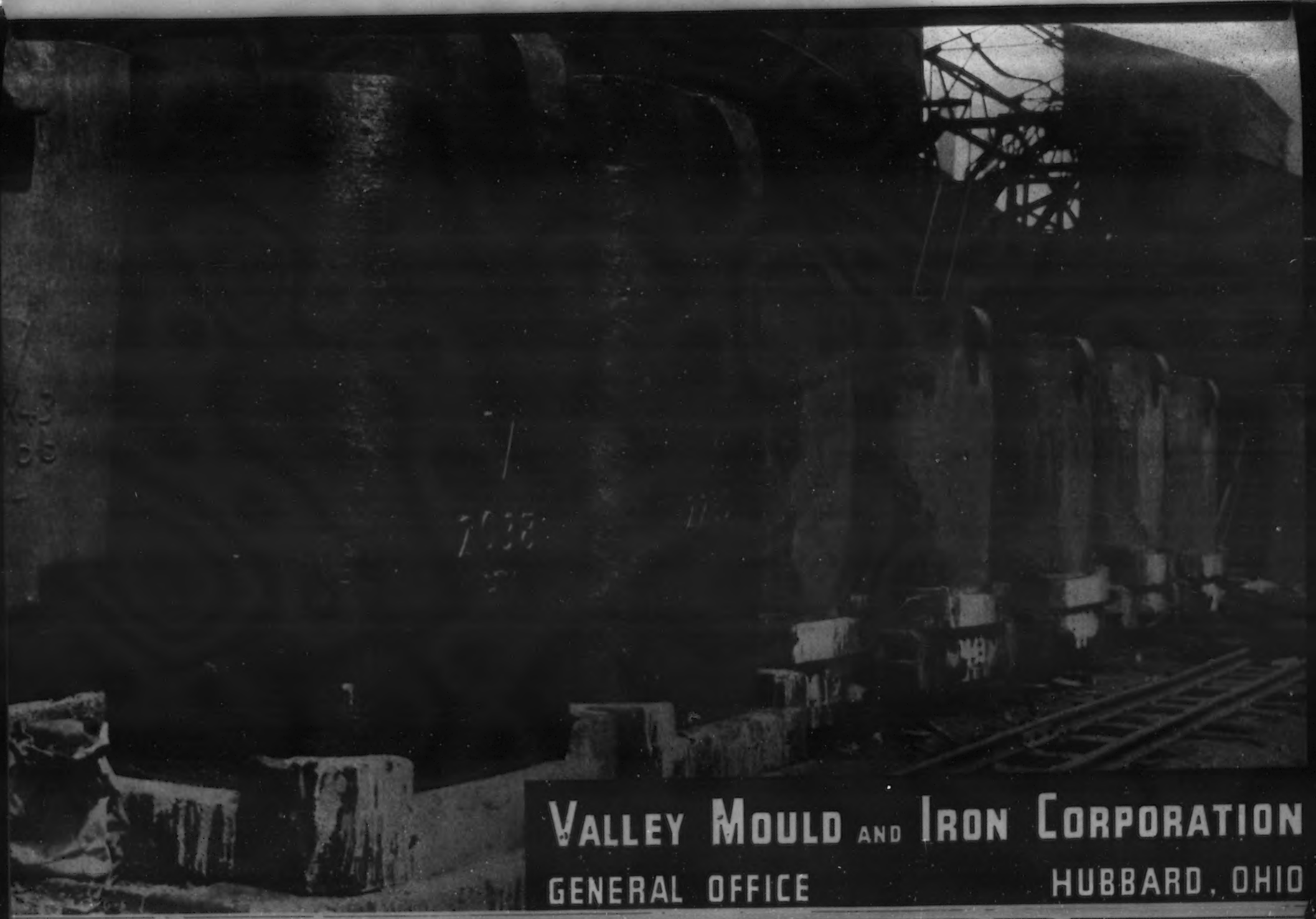
The rapid and remarkably widespread shift of this very development probably is little realized by the country at large. Powers today rest in the hands of the President which greatly exceed those given war Presidents. And still more power is being sought and through the renewed move to pack the Supreme Court, it is proposed to retain them, once they are granted.

Leads to Straight-Jacketing

Because of this condition of affairs, it is remarkable that any group, either labor or management, which is truly attached to a Democratic form of Government, should encourage, much less advocate, legislation that broadens and tightens regimentation, legislation that goes way beyond reasonable Governmental activities. For inevitably the means to the objectives, some of them worthy within themselves, sooner or later lead to straight-jacketed Governmental control that dulls enterprise. It acts like an opiate which soothes temporarily but whose aftermath finds the malignancy of the disease intensified, as may be seen under dictatorships abroad.

And once set up, it is almost impossible to break down bureaucracy. Erected in the name of emergency with smug promises of their elimination when the "emergency" is over, the country has seen alphabetical agencies strung endlessly one after another to engage in snooping into and controlling almost every conceivable pursuit of its people and their avocations. The "emergency" agencies that have passed out of the picture are only those that have been knocked out by the courts, and efforts now are being made to revive them. The others are being "extended" or being made permanent, building up a tremendous Federal payroll for 850,000 "workers," many of whom are merely parasites.

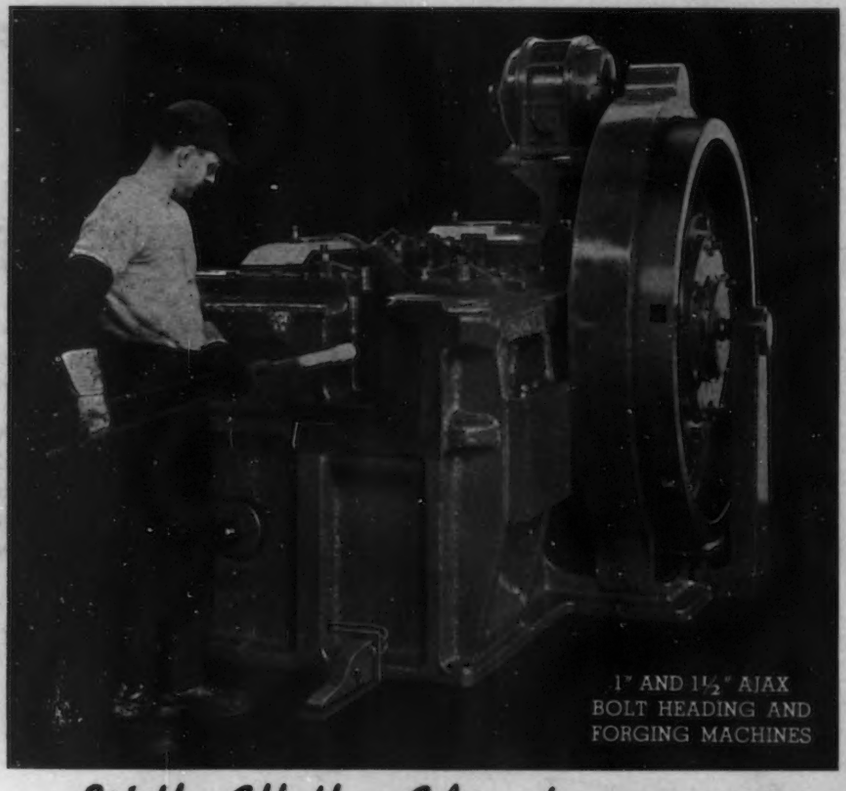
Under these acts of emergency, the startling and unprecedented sum of $13,000,000,000 has been coolly handed over to one man—the President of the United States—to dispose of almost willy nilly and there is no doubt huge expenditures in way of relief funds, agricultural subsidies, "loans," WPA rolls, etc., with their political concomitants, have been an enormous nation-wide demoralizing influence. Such tremendous sums could not possibly have been distributed with equity by any human organization, particularly during the darkest days of the depression. But they could have been distributed more fairly and in much smaller quantities and with vastly less political design in subsequent days, and for one thing provided more generous treatment to those


VALLEY MOULD AND IRON CORPORATION
GENERAL OFFICE
HUBBARD, OHIO

who were worthy as contrasted with many who were and are not worthy. Those, who, for instance, to paraphrase Harry Hopkins, are thinking of their WPA "jobs" as a career.

The President of the United States, not Congress, today can change the value of the gold dollar. Given this excessive power he upped gold to $35 an ounce and has left it there. This was done in the name of emergency. The act was extended for two years by the recent Congress and a long list of other "emergency" powers of great magnitude which were given the President by a compliant, politically-minded Congress, have been extended. Yet the New Deal spellbinders ballyhoo its wonders in turning, magic-like, the United States from a land of despair and deep depression into a land of happiness and high prosperity, "emergencies" only an unpleasant memory. Possibly they fear their resurgence in the constantly growing national debt, elevated to the dizzy altitude of more than $37,000,000,000 ($285, for each man, woman and child); constantly growing deficits, alarming rise in the costs of living and nothing but lip service about balancing the badly unbalanced budget. Expenditures are not being decreased. They are constantly being increased. And more talk with prospective action for further centralization of Government.

Certain it is that support of any group for increased regimentation will only lend impetus to these distracting forces. And unless they are checked there is real danger—it is no wild fancy of the mind—of this Government taking on a foreign shade smacking of detestable dictatorship. And the checking obviously must be done by orderly processes of protest with a cessation of support for regimentation. The move also will be healthy in checking certain absurd movements that may or may not be taken seriously but which have apparently gained strength recently—such as the ridiculous vigilante and the grotesque Nazi maneuvers.



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Britain Again Gets Ore From Spain

LONDON (*Special Correspondence*)—The first cargo of iron ore from Bilbao since General Franco captured that great iron port was landed at Cardiff, Wales, recently.

The resumption of the iron ore trade of Bilbao with South Wales under the agreement with General Franco resuscitates a trade which is most essential to the Welsh iron and steel industry. The bulk of the iron ore requirements of South Wales are normally received from Bilbao and other ports in Northern Spain. The outbreak of the civil war led to a sharp curtailment of supplies, making it necessary for iron and steel manufacturers to obtain alternative supplies from Algeria, Sweden, and producing countries more distant. Contracts for supplies were made even with countries as far away as Brazil and Newfoundland, and it is likely that supplies from these new sources will continue to be imported for a considerable time.

Van Norman Machine Tool Co., Springfield, Mass., reports the largest number of unfilled orders in its history and enough business on books to insure capacity operations until well into 1938.

Intrastate and Captive Coal Problems Complicate Work of New Commission

WASHINGTON, Sept. 14.—The National Bituminous Coal Commission, which is scheduled to make its price-fixing debut on Oct. 1, is suffering from a bad case of stage fright primarily because of the intrastate and captive coal problems.

The commission has intimated it intends to bring both these classes of coal under its wing, although it is now believed in some quarters that it is backing down in this connection possibly because of a sudden realization that its action might have to be defended in court.

On the other hand, officials are said to have expressed the view privately that unless the bulk of intrastate coal shipments can be brought under the code's jurisdiction, the entire price structure will ultimately collapse. It is known, too, that commission officials regard transfer of captive coal from a mining company to its parent organization as having a "distinct effect" on the general price level. Consequently, jurisdiction over the captives is desired also. These reasons are, of course, in addition to an ostensible thirst for power, evidenced ever since the agency took office.

Faces Litigation

But the crux of the whole thing, according to reliable sources, is that the commission faces almost certain court litigation if these steps are taken and the view is advanced that probably no one realizes it more than the coal board itself. The act specifically provides that the coal code is "applicable only to matters and transactions in or directly affecting interstate commerce" and that the price-fixing and marketing provisions "shall not apply to coal consumed by the producer or to coal transported by the producer to himself for consumption by him."

Despite these sections, the soft coal commission has busied itself by calling hearings to determine, as the commission puts it, "what, if any, coal" produced within a particular state does not directly affect interstate commerce in coal. Captive mines seeking exemption have been told the commission requires the "fullest information" and that the "burden of proof" rests with them to show why the exemption should be granted.

This strategy, it is believed, was decided upon before the President's court packing plan was defeated in the Senate and at a time when the commission could see nothing but clear sailing ahead. Then when the Supreme Court's favorable Wagner Act decision gave it another shot in the arm, the agency thought its constitutional future was assured. Since then, however, the board's attorneys, reluctantly laying aside rose-tinted glasses, have viewed the act in a different light. That is understood to account for the present bad case of jitters.

Observers who have been following the captive mine situation have difficulty in keeping up with the commission. Of the five hearings called to consider requests for exemption filed by steel captive

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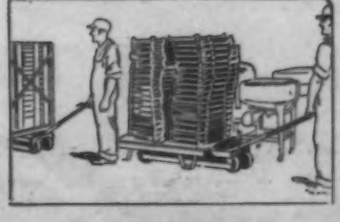

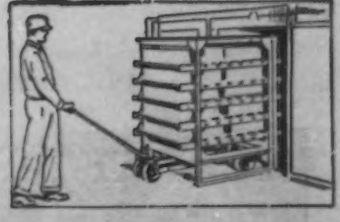

mines, only two, it has been learned, ever materialized and one of these has since been "postponed indefinitely."

It covered the request of seven United States Steel subsidiaries including the Carnegie-Illinois Steel Corp., the H. C. Frick Coke Co., Hostetter-Connellsville Coke Co., the National Mining Co., the Sharon Coal & Limestone Co., United States Coal & Coke Co., and the United States Fuel Co. No reason has been forthcoming from the commission for the postponement but it has been announced that the hearings "may be reopened on 10 days' notice" from either party.

Two other United States Steel Corp. subsidiaries, the Columbia Steel Co., San Francisco, and the Tennessee Coal, Iron & Railroad Co., Birmingham, have withdrawn applications for captive mine exemptions. The coal commission did not state the reason for the withdrawal. There were reports, however, that depending upon the outcome of present cases the applications may be renewed. The Pittsburgh Steel Co. has been given until Sept. 26 to file briefs which previously were due on Sept. 6 covering an application seeking exemption. Hearing was held on Sept. 8 on an exemption application filed by the Wheeling Steel Corp., Wheeling, W. Va.

Enthusiasm Is Lacking

Enthusiastic response to the coal board's program is difficult to find in Washington. Some operators frankly concede that the industry is more concerned with finding new uses for coal than it is in the stabilization program embodied in the coal law. Also, they are worried about the Government's contemplated entrance into the electric power field in direct competition with bituminous coal.

The coal board, red-faced with embarrassment over the New Deal sponsorship of the Norris bill, is on the spot, although its hands are tied from waving the flag for the coal operators, who are battling hammer and tongs against the bill. The measure would plunge the Federal Government even deeper into the hydro-electric power field through a series of TVA set-ups all over the country. Hence, some operators are more interested in the failure of the Norris bill than they are over the success of the new coal law.

Briefly, their view is that, if the Federal price-fixing machinery can be made to function smoothly, they are in favor of it. But those who learned through NRA experience that the coal code couldn't be enforced, and those who watched the politically-minded commission work under the old Guffey law, are skeptical, to put it mildly.

In the meantime, the patronage-torn commission, whose members are still smarting under the "poor timber" label given them by General Hugh S. Johnson, the soft coal czar under the NRA, admits it faces a tough job. But, says the chairman, the speed with which the board has exercised its powers thus far has surprised even members of the industry.

But with the commission finally facing a showdown on the intrastate and captive coal puzzle, its former pace may be slackened considerably. Some even go so far as to forecast the Oct. 1 price-fixing date will be postponed for a while at least.

National Association of Fan Manufacturers will hold a meeting at the Equinox House, Manchester, Vt., on Sept. 23, 24, 25, when consideration will be given to the report of the engineering committee covering certain refinements and additions to the standard test code for disk and propeller fans, centrifugal fans and blowers.

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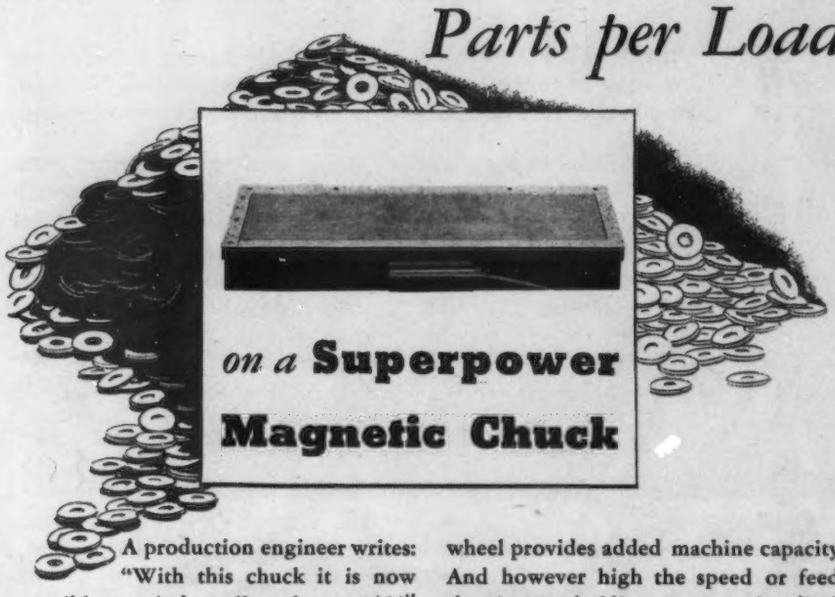

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Steel Workers Add 63% To Value of Raw Materials Used

WAGE-EARNING employees of the steel industry were furnished with an average of $3,767 worth of raw materials in 1935, from which they produced an average of $6,155 worth of finished iron and steel, according to calculations by the American Iron and Steel Institute based on the recently issued Federal Census of Manufactures for that year.

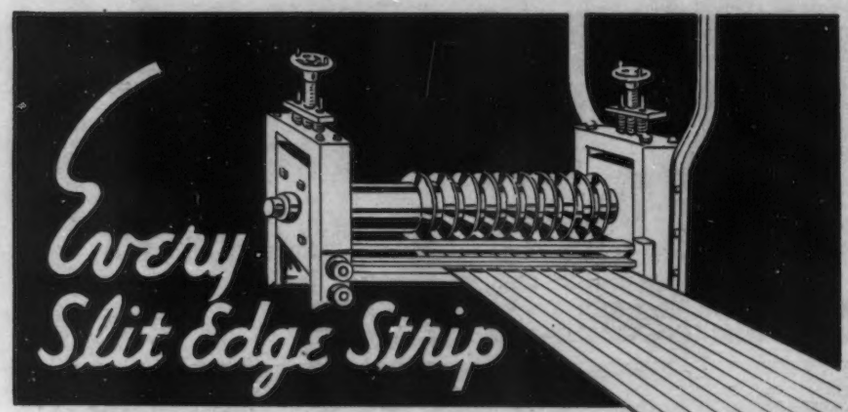
Total value of the raw materials purchased by the steel industry in 1935 was listed as $1,411,000,000 by the Census report, while the total value of iron and steel produced from the materials was $2,305,000,000. The difference of $894,000,000 represents the value which was added to the raw materials by the industry's manufacturing processes.

The Census figures show that an average of 375,000 steel wage earners received in wages an average of $1,224 each during 1935. For 1937 it is estimated that the average annual income of steel workers will exceed $1,730. The 1935 wage was equivalent to 51 per cent of the value which they added to the raw materials. By comparison, the employees of all other manufacturing industries received in wages an average of $1,012 during 1935, or 38 per cent of the value they added by processing the various raw materials furnished them.

By paying out in wages an amount equal to more than 50 per cent of the value added to raw materials by manufacturing processes, the steel industry ranked among the top 10 per cent of the total of 370 industries which were covered by the Census of Manufactures.

The balance of $2,388 per man remaining after deducting cost of raw materials from the value of its products was used by the steel industry to pay the other costs of operation such as wages, new equipment, interest, depreciation, taxes, sales expense, research, etc.

After all these expenses were met, the net profits of the industry in 1935, before dividends to stockholders, amounted to only $114 per man employed, according to data compiled by the American Iron and Steel Institute. Dividends to the half million stockholders, whose investments furnish the great bulk of the industry's capital, represented an average of $71 for each employee at work, leaving only $43 to be added to the industry's surplus funds for each man who was on the payrolls during 1935.



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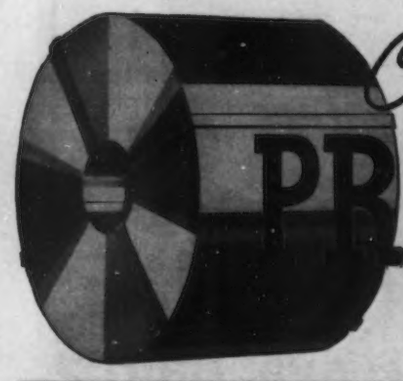

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NLRB Decisions Are Announced

WASHINGTON, Sept. 14.—The National Labor Relations Board has announced settlement of a labor dispute involving the E. T. Fraim Lock Co., Philadelphia, and the local CIO division of the Amalgamated Association of Iron, Steel and Tin Workers. The board said both the company and the union had agreed on a mutual settlement in the early stages of the board's participation, thereby

avoiding "lengthy and expensive legal processes." The NLRB complaint was issued against the company on Aug. 16, charging ownership and domination of two plant unions and discharge of 42 workers allegedly because of union membership.

At the same time, the Labor Board ordered the Kentucky Fire Brick Co., of Haldeman, Rowan County, Ky., to reinstate 30 employees who, it was charged, had been dismissed for joining the brickworkers' union and for collective bargaining activity. Forty-two other workers, the board found, had not been discriminated against as charged in the complaint, and the reinstatement order did not cover these employees. The Kentucky Fire Brick Co. is a subsidiary of Carnegie-Illinois Steel Co.

The board also announced recognition of the CIO's United Electrical and Radio Workers union as the exclusive collective bargaining representative for employees in Mergenthaler Linotype Co., Brooklyn. In one department, however, the AFofL metal polishers, platers and buffers' union has been certified by the board as representing a majority of the workers. Elections were conducted by the board on Aug. 10, following the receipt of a representation petition filed by the CIO union.

Wheeling Steel Asks Exemption on Coal

WASHINGTON, Sept. 14.—Representatives of the Wheeling Steel Corp. appeared before the National Bituminous Coal Commission on Sept. 8 and asked exemption from the coal code on behalf of their Beach Bottom (W. Va.) mine and their wholly owned subsidiaries, the Consumers Mining Co., of Pittsburgh, and the Emperor Coal Co., of Kentucky.

Carl Schmidt, counsel and G. W. Hewitt, director of the corporation's raw material division and president of the Consumers Mining Co., both of Wheeling, W. Va., told commission examiners that over 1,000,000 tons of coal had been mined in 1936 by the company's mine and its subsidiaries and that substantially all of that tonnage had been consumed by company plants. In addition, it was testified, the corporation purchased close to 1,000,000 tons the same year to supply its demands.

Commission examiners questioned Messrs. Schmidt and Hewitt in detail in an effort to prove transfer of title on coal shipped from the company's captive mines to its plants, a factor which the commission has indicated would justify the inclusion of captive coal under the code.

B. T. Ansell, an attorney for the commission's District Board No. 8 with price-fixing jurisdiction in Kentucky, protested against granting any exemption to the corporation's Freeburn (Ky.) mine operated by the Emperor Coal Co. He testified that the company's coal was sold in competition with that of operators in his district. Figures submitted by counsel for Wheeling showed the entire production of the mine was used by the corporation and that it did not enter the commercial market.

The Wheeling hearing had been postponed from Aug. 17. The company complained that insufficient time had been allowed it for the preparation of the case and the commission granted an extension of time.

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...OBITUARY...

HERMAN DIEDERICHS, dean of the College of Engineering at Cornell University, died at the Clifton Springs sanatorium on Aug. 31, aged 63 years. For 44 years Professor Diederichs had been identified with Cornell University as a student, teacher and as dean of the engineering colleges. He was regarded as an authority in experimental engineering with special reference to materials of engineering and was the author of several books on the subject.

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N. V. HYBINETTE, inventor of the electrolytic process of refining nickel, died in Malerno, Italy, on Sept. 7, aged 70 years. He was born in Falun, Sweden. Having established a reputation in the metallurgy of nickel in Norway, he came to the United States, where he was made general superintendent of the Orford Copper Co., Bayonne, N. J., now merged with the International Nickel Co. After serving in that capacity from 1892 to 1904, he became chief metallurgist of the company. In recent years he was president of Hybnickel Alloys Co., Wilmington, and of the Nicralumin Co., Jackson, Mich.

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EDWARD F. PINK, president of the Cambridge Wire Cloth Co., Cambridge, Md., died of a heart attack on Aug. 23, aged 69 years. He founded the company of which he was head in 1915. Prior to that he was successively foreman and plant superintendent of the Estey Wire Works Co., Cambridge, Md.

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ADAM WAGNER, president of the Wagner Mfg. Co., Cedar Falls, Iowa, died on Aug. 10, aged 66 years.

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GEORGE ADOLPH SCHREIBER, widely known in the automobile industry, died late in August, several weeks after he was injured in an automobile accident. He was 56 years old. Mr. Schreiber was known as an active supporter of the American Society of Tool Engineers, a world traveler and a consulting engineer to the automobile industry. Born in Germany 56 years ago, he came to the United States 30 years ago from the Daimler Motor Works, where he had charge of tool design and shop equipment. In his early days in Detroit he was closely associated with automotive executives and engineers now well known in the industry. He was first with the old E.M.F.Co. when Piquette Avenue was Detroit's motor row, with Henry Ford's shop "next door" and the Fisher Brothers just starting out nearby in a small shop. Mr. Schreiber's duties involved the handling of engineering, export and sales matters which led him to travel in many foreign countries. In 1920 and 1921, when Walter P. Chrysler reorganized Willys-Overland, Mr. Schreiber was made production engineer. In later years he was connected with the White Motor Co., Cleveland, and General Motors Truck Co., Pontiac.

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CHARLES MCNELLIS, secretary of the Imperial Brass Mfg. Co., Chicago, died in the Garfield Park Community Hospital in Chicago on Aug. 17, aged 46 years.

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CHARLES S. MCINTYRE, president of the Monroe Auto Equipment Co., died recently at the age of 59 years. He had been in the equipment manufacturing business since 1917. Prior to that he was one of the first motor car dealers in the territory around Monroe, Mich. With three associates, Mr. McIntyre incorporated the Brisk Blast Mfg. Co. in 1917 and became vice-president in 1918. In 1919 the firm name was changed to Monroe Auto Equipment Co. and four years later Mr. McIntyre was elected president.

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WILLIAM E. MARCHANT, designer of the first of the modern coach type automobile bodies, was buried Sept. 8 at Detroit. Mr. Marchant, a research engineer, was with Tomkins-Johnson Co. at East Grand Boulevard and Oakland Avenue, Detroit. He was born in Iowa 54 years ago and came to Detroit in the early days of the automobile industry. He left to go to Los Angeles, where he spent some years engaged in the design of metal airplanes. Seven years ago he returned to Detroit and since then has been engaged in the machinery business.

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JOHN LEONARD TAYLOR, founder and president, Taylor Mfg. Corp., Milwaukee, and noted inventor of precision instruments and special purpose machinery, died on Sept. 7, aged 51 years. He was born in Richlands, N. C., and after completing courses at North Carolina and Duke Universities, received his engineering degree from the University of Indiana.

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ARTHUR W. WELLMAN, founder and president, Capital Wire & Fence Co., now the Capital Wire Co., Madison, Wis., died on Sept. 3, aged 81 years. He was born at Mentor, Ohio, and after many years in the midwestern field as representative of the American Steel & Wire Co., established his own industry in Madison in 1900, retiring about eight years ago. Mr. Wellman interrupted his business career for a time in 1909-'10 to assist his brother, the late Walter Wellman, noted newspaper man and Arctic explorer, in an effort to reach the North Pole in a dirigible

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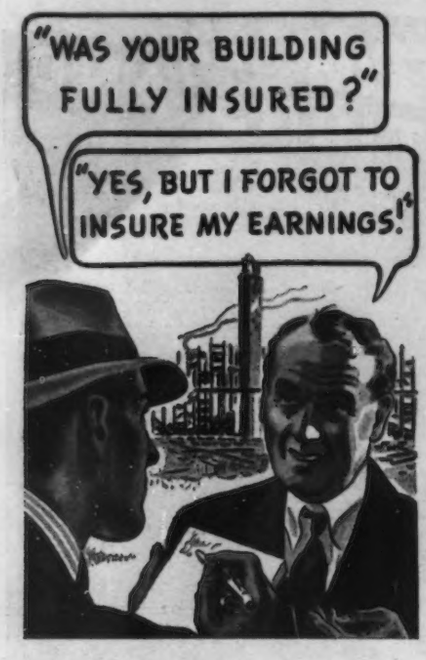

When a fire or other peril destroys your plant, the visible loss of buildings, machinery and stock leaves nothing to the imagination, but there is also an invisible loss which is nevertheless just as real.

Even when your insurance on buildings, machinery and stock is adequate for replacement, many months may elapse before production can be resumed. Meanwhile the earnings which pay salaries, interest, preferred dividends and many other expenses—to say nothing of net profit—are likewise shut off.

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balloon. The epochal expedition failed of its objective, however.

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JAMES M. AUSTIN, Pittsburgh district sales manager, National Refractories Co., died in Pittsburgh on Sept. 1, aged 43 years. Mr. Austin had been connected with the refractories industry for 15 years. He has been identified with National Refractories since September, 1935, when the company was organized. He was formerly with General Refractories Co., as Cleveland manager.

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LEWIS W. HICKS, JR., assistant secretary-treasurer, Allegheny Steel Co., Brackenridge, Pa., was killed Sept. 4 on a Pittsburgh golf course by a bolt of lightning. He was 35 years old.

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Armco Blows in New Blast Furnace

THE first new blast furnace to be completed in the United States since 1930, when the International Harvester Co. built a new one on the site of an old one in South Chicago, has been put in blast at Hamilton, Ohio, by the Hamilton Coke & Iron Co., wholly-owned subsidiary of the American Rolling Mill Co. Technically the International Harvester furnace did not count as a new one since it merely replaced one that was torn down, so barring this one stack the Hamilton installation is the first new furnace built in the United States since 1928.

This new furnace, which is designated as Hamilton No. 2, has a daily capacity of 500 tons. The output will be marketed among foundries and steel companies in the Hamilton territory. Hamilton No. 1 furnace was rebuilt a year ago and its daily capacity increased to 700 tons. Output of No. 1 furnace is used in the open hearths of the American Rolling Mill Co., at Middletown, a few miles away, the hot metal being transported in specially designed "thermos" cars.

With the addition of the new unit, the total number of available blast furnaces on THE IRON AGE list is 239.

A 96 per cent gain in the Canadian purchases of American mining, well, and pumping equipment during the first half of the year compared with January-June, 1936, reflects the high rate of activity in both the manufacturing and resources industries in that country, according to the Machinery Division of the Department of Commerce. Operations in the major Canadian industries have been well ahead of last year, with some of them working at near capacity levels and adding to their productive equipment, it was stated.

Air Conditioning Gains in Exports

AIR conditioning equipment is meeting with a growing popularity and recognition of its advantages throughout the world, according to the Machinery Division of the Department of Commerce. American manufacturers are leading all other countries in both the development of this equipment and its introduction into foreign markets. Their sales abroad have expanded from $320,558 worth in 1935, the first year in which they were reported separately in the official export statistics, to $883,482 in 1936, and another substantial increase is indicated for the present year as the shipments during the first 6 months already total $794,756, an 89 per cent increase over the exports during the corresponding period of 1936 valued at $421,452.

Up to the present time, most of the success realized by American manufacturers in developing foreign demand has been obtained in the commercial and industrial field. Much less headway has been made in building up any substantial business in the residential trade, owing primarily to the low purchasing power of the average family in many countries.

The division states that the Union of South Africa and Argentina were our leading foreign markets for this equipment during the first half of this year, taking respectively $84,544 and $84,474 worth, compared with $40,487 and $75,278 worth during the first six months of 1936.

Scullin Steel Co. Plan Is Confirmed

UNITED STATES District Judge Collet has confirmed the modfied plan of reorganization of the Scullin Steel Co., St. Louis, and it will be put into effect within approximately 90 days.

The modified plan contains these provisions: First mortgage bonds of $3,062,600 will be cancelled and new bonds in the same amount issued, with fixed interest at 3 per cent and an additional 3 per cent if earned. The bonds will be convertible into common stock before Oct. 1, 1944, at the rate of 30 shares for each $1,000 bond.

Thirty-thousand shares of common stock will be exchanged for new common stock at the rate of three shares of old for one of new.

Debentures totalling $1,479,000 are convertible into common stock at the rate of 20 shares for each $1,000 debenture.

THERE'S A NEW CROP COMING
IF WE CAN'T GROW HAIR, WE'LL HIRE IT
AND PLANT BENEATH IT ALL THE SPRING
KNOWLEDGE WE POSSESS—SO THAT YOU
MAY ALWAYS HAVE
GOOD SPRINGS*

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DUNBAR BROS. CO.
DIVISION OF ASSOCIATED SPRING CORPORATION
BRISTOL CONNECTICUT

Chace Thermostatic Bimetal is the active element used in the "Motor Cop" to assure automatic protection against overloads in fractional horsepower motors without the handicap of adherence to customary 140% of overload value limits.

If you make a product that calls for automatic action at a given temperature or if your product is to control temperature—use Chace Thermostatic Bimetal, a type for every purpose. Sold in sheets, strips and in shapes ready for assembly.

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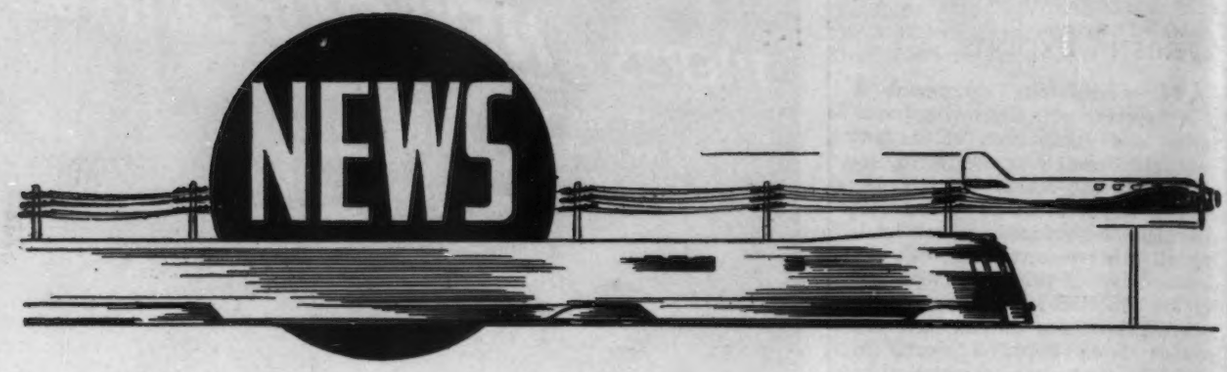

Steel Industry Earns ⅓ of 1c. Per Pound of Shipments in First Half

NET earnings of 100 iron and steel producing companies in the first half of 1937 aggregated $159,054,209, and were equivalent to a profit of about one-third of a cent per pound of iron and steel shipped by the companies during the period, according to a report compiled by the American Iron and Steel Institute.

The earnings during the half year period represented an average return of 4.17 per cent on investment. Shipments of iron and steel products, including pig iron, by the group of 100 companies during the six months amounted to 23,875,442 gross tons. Rate of operations in the industry was 85 per cent of capacity during the period.

Payrolls of the companies reporting, including payrolls of certain subsidiary companies which do not produce iron or steel, totalled $580,643,012. This sum was almost eight times as large as the total of $72,813,307 in dividends which was paid to stockholders during the period.

The volume of payrolls in the first half of the year was 46 per cent greater than the total of $396,662,446 paid out in payrolls during the first half of last year by the same group of companies. Employment likewise showed a substantial increase over last year, 695,534 being employed by the group of 100 companies reporting this year, or 23 per cent more than the 563,473 employed a year ago by the same companies.

Tax payments of the industry increased sharply in the first six months, largely as the result of higher tax rates under the social security laws.

A total of $86,438,993 in taxes was paid by the companies during the half year. By comparison, the same companies in the first half of last year paid out only $41,977,747 in taxes, indicating an increase within one year of more than 105 per cent in the total of taxes levied on the industry.

Unemployment reserve taxes levied on the payrolls of the industry accounted for $11,395,887 of the total taxes paid in the first half of 1937, while an additional $5,815,106 represented levies under old age pension fund provisions of the social security act. The latter sum was matched dollar for dollar by the compulsory deductions from employees' pay envelopes, which averaged $8 for each employee of the companies.

Manufacturers Will Exhibit in Baltimore

THE second annual Manufacturers' Products Exhibit, sponsored by the Purchasing Agents Association of Baltimore, will be held Oct. 19-21 at the Lord Baltimore Hotel, Baltimore.

The exhibit will consist of approximately 95 booths displaying the latest types of equipment for factory and office. Frank H. Carter, 220 East Pleasant Street, Baltimore, is chairman of the exhibit committee.

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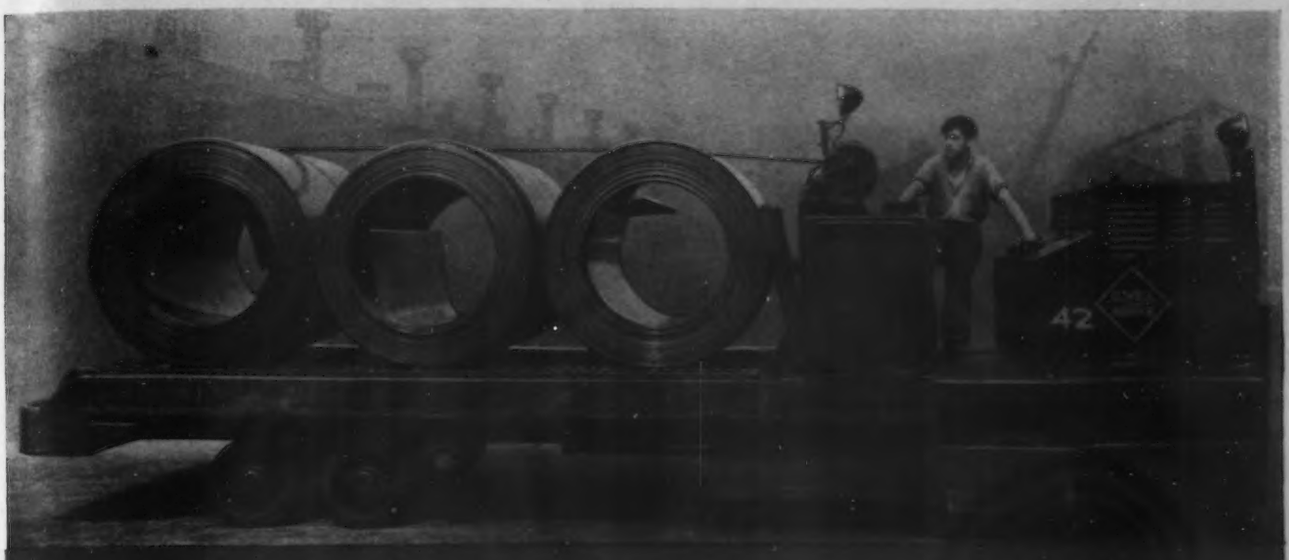


THE FIRST CHAIN TRUCK TO HANDLE 76" COILS OF STRIP WAS AN ELWELL-PARKER P-6

● Even the most unique method of steel transportation soon is quickly forgotten for itself—though appreciated through the years because of its excellent daily performance.

The small view shows the first Chain Truck, P-6, to go into active service. The large picture shows it at work, about a year after it had been installed. This Truck was one of two designed by Engineers of the Steel Company and of Elwell-Parker, who built them, *and the first of its kind to be put into service.*

Elwell-Parker supplied these pioneering Model P-6 Chain Trucks because of unusual loads, handled under unusual conditions. Longer hauls, for example; speedy rate of travel; exceptionally large coils (up to 60" diameter, and totaling 20 tons); quick yet careful loading and unloading by means of chains, the speeds of which were timed to avoid damage to the coils transported.

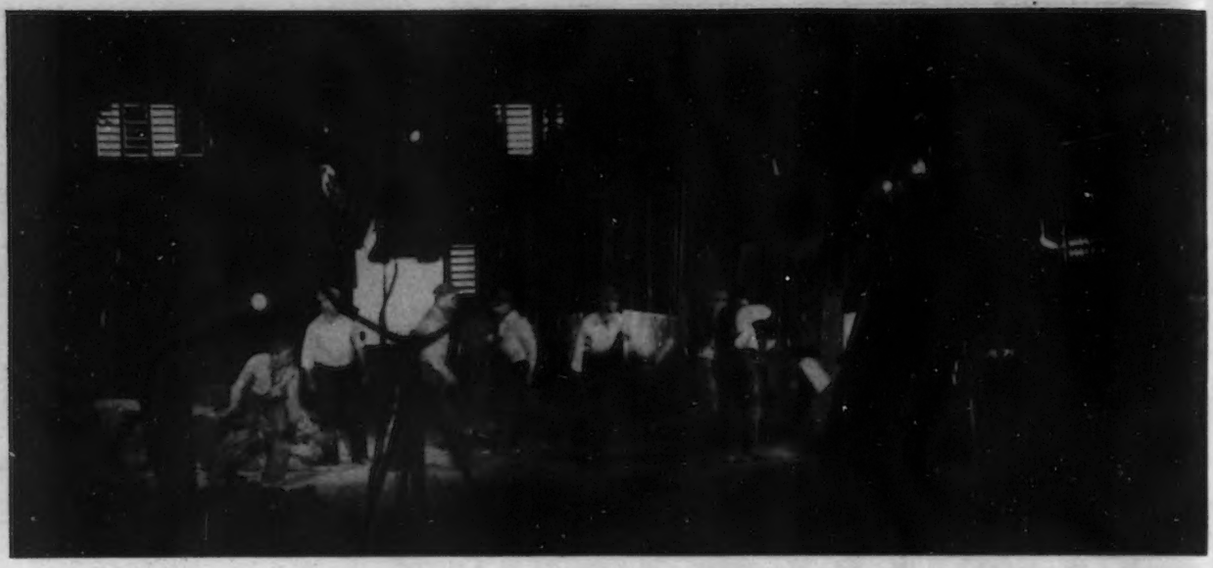
Today, with transportation taking on new importance as a factor in lower-cost production of steel, Transportation Engineers find Elwell-Parker's co-operation of major importance in designing Truck Equipment for special, as well as all standard, transportation jobs.

Elwell-Parker has built for Steel for a generation. Its advance planning, backed by such practical experience, will bring a quick solution of your own problems when you call in an Elwell-Parker Steel Engineer. The Elwell-Parker Electric Co., 4225 St. Clair Ave., Cleveland, O.

To make still Bigger Cuts in costs of Load-Handling in *Your* Plant, Elwell-Parker has the Engineering Staff to design "Specials," where its long line of Standard Trucks will not ultimately earn the most money for you.

New Type **ELWELL·PARKER** *Trucks*

ESTABLISHED 1893 • BUILDING POWER INDUSTRIAL TRUCKS SINCE 1906



"Shooting" Begins on First Feature Length Technicolor Industrial "Talkie"

SCENE at Gary works of Carnegie-Illinois Steel Corp. as a Hollywood camera crew began photographing operations at the No. 5 open-hearth furnace. The new picture, costing more than $200,000, is being produced for the United States Steel Corp. by Hollywood director Roland Reed and a troupe of 21 camera men and technicians. Mr. Reed is shown directing a "shot" of workmen adding manganese to the bath. Pictures will be taken in about 20 plants of U. S. Steel in making this feature picture, which will consist of three reels of Technicolor and six of black and white.

Britain Faces Coke Shortage; Is Importing

LONDON (*Special Correspondence*).—The serious situation which has arisen out of the steadily increasing shortage of coke in the United Kingdom is expected to reach its most crucial point when the big domestic demand for the fuel makes itself felt with the return of cold weather. It is calculated that there is at present a shortage of approximately 1,000,000 tons of coke in the London area alone.

The reasons for the coke shortage are several. With the big demand for iron and steel this year, coke producers have been concentrating on the production of metallurgical coke and ignoring the demand for domestic purposes.

The position has been aggravated by the fact that there had arisen a considerable lag between the construction of new furnaces and the building of new coke ovens. It is understood, however, that this lag is slowly but steadily being overtaken.

Production of coke was also seriously curtailed by the recent strike at the coke ovens in the Yorkshire coal field.

Many iron and steel works are being hit by the coke shortage. One

NO ONE WILL EVER SEE WHAT MAKES

● Any machine can have gadgets, put there by a designer. A Warner & Swasey Turret Lathe has *character*, put there by 65 years of a single ideal . . .

You must be satisfied with the transaction—not only the day you buy but for years.

You must make more out of our machine than we do. Our customers average 20% net profit on their investment in W & S Turret Lathes.

If our machine and service cannot be proven to fill your needs, we will tell you so—and frankly we do not want the order.

Every one of us, from president to oiler, is proud of every bolt and thread, every ounce of metal we build into these machines—and the interesting part of it is that users share this pride.

You can't see these things—we can't put them adequately into words. You'll only know what makes a Warner & Swasey Turret Lathe great when year after year it keeps on producing for you, at a profit, with little or no upkeep, less down time and scrap loss, more output, greater accuracy, less effort for your operators.

WARNER & SWASEY
Turret Lathes
Cleveland

MONTHLY SHIPMENTS OF FINISHED STEEL PRODUCTS BY UNITED STATES STEEL CORP.—TONS

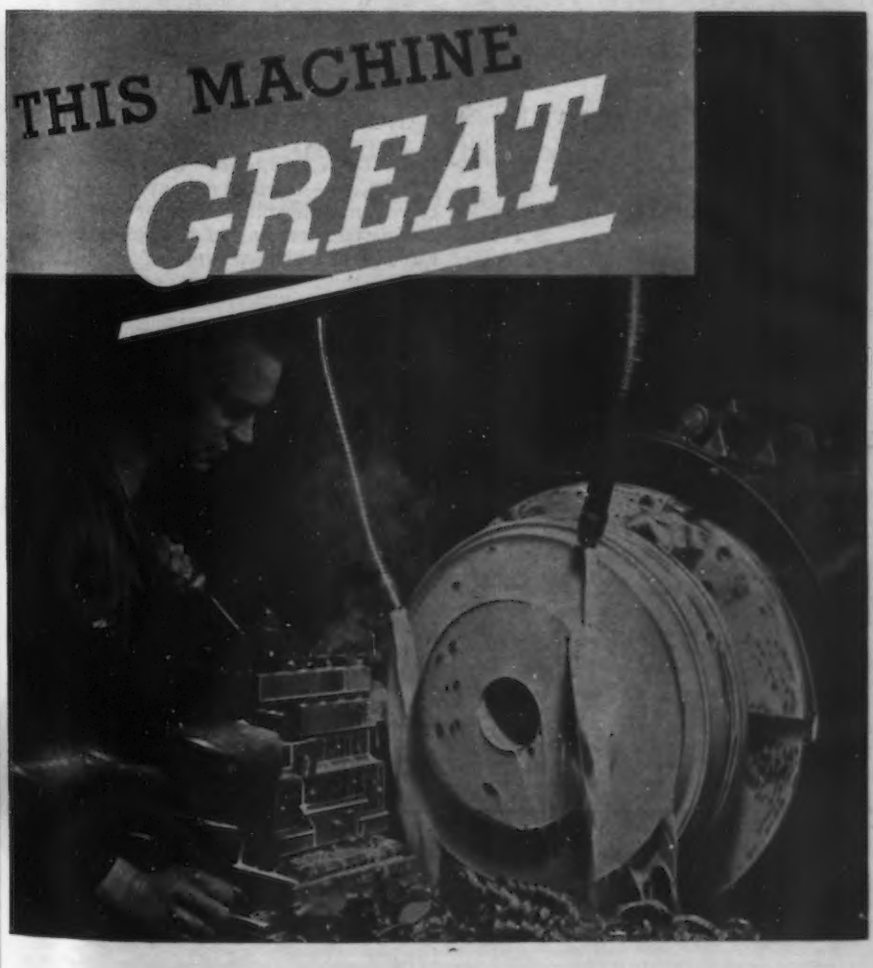
Month	1933 Shipments	1933 Per Cent of Capacity	1934 Shipments	1934 Per Cent of Capacity	1935 Shipments	1935 Per Cent of Capacity	1936 Shipments	1936 Per Cent of Capacity	1937 Shipments	1937 Per Cent of Capacity
January	285,137	17.7	331,777	19.8	534,055	31.9	721,414	44.8	1,149,918	*75.4
February	275,929	18.5	385,500	25.9	583,137	39.2	676,315	45.3	1,133,724	82.5
March	256,793	15.3	588,209	35.2	668,056	41.5	783,552	50.5	1,414,399	92.7
April	335,321	21.6	643,009	41.5	591,728	36.7	979,907	63.2	1,343,644	91.0
May	455,302	27.1	745,063	44.5	598,915	35.8	984,097	63.4	1,304,039	85.5
June	603,937	37.4	985,337	61.2	578,108	36.7	886,065	57.1	1,268,550	85.8
July	701,322	45.1	369,938	23.9	547,794	34.0	950,851	61.3	1,186,752	77.9
August	668,155	39.8	378,023	22.6	624,497	37.3	923,703	59.6	1,107,858	72.6
September	575,161	35.6	370,306	23.9	614,933	39.7	961,803	62.0	.....	...
October	572,897	35.5	343,962	20.6	686,741	41.1	1,007,417	62.6	.....	...
November	430,358	26.7	366,119	22.7	681,820	42.3	882,643	59.2	.....	...
December	600,639	38.7	418,630	27.0	661,515	42.7	1,067,365	68.8	.....	...
Plus or minus yearly adjustment	(+44,283)	...	(—19,907)	...	(—23,750)	...	(—40,859)	...	.....	...
Total for year	5,805,235	30.1	5,905,966	30.6	7,347,549	38.1	†10,784,273	58.2	.....	...

* Annual capacity 17,929,400 gross tons, with monthly percentages based on actual number of weeks in each month.
† Adjusted.

big works, for example, has had to resort to using the old type beehive oven for making coke for its own works.

Coke which was selling in central England last year at 25s. 6d. ($6.37) per ton is now fetching 40s. ($10) per ton. A correspondingly steep rise has taken place in all parts of the country.

Meanwhile, imports of Belgian hard coke are coming to Britain in increasing quantities in an effort to relieve the shortage, and a contract has just been placed for the immediate supply of a further 100,000 tons.



U. S. Steel Shipments Make August Record

SHIPMENTS of finished steel products by subsidiary companies of the United States Steel Corp. during August broke all records for that month since 1929, although they were down slightly from the July total. In August, 1,107,858 gross tons was shipped, down 78,894 tons from the July shipments of 1,186,752, but 184,155 tons higher than the August, 1936, figure of 923,703 tons. In August, 1929, 1,360,523 tons was shipped.

For the eight months of 1937, shipments were 43 per cent above the comparable period in 1936. The cumulative totals are 9,908,884 and 6,905,904 tons respectively.

August shipments were 72.6 per cent of capacity, based on an annual capacity of 17,929,400 tons and 4.43 weeks in the month.

G. E. Employees Have Long Records

MORE than 40 per cent of the employees of General Electric have worked with the company for 10 or more years, 42,785 have been employed more than five years, while those with 10 or more years of service number 32,019, a recent survey by the company showed.

Fifty-three employees have been with the company 45 or more years; more than 200 for 40 years or more; more than 1000 for 35 or more years; 6383 are eligible for the Quarter Century Club for those of 25 or more years of service; 11,705 have worked 20 or more years and 19,773 have been employed 15 or more years.

Carnegie-Illinois' Chicago Plants Break Production Records

THE establishment of 10 new production records by two of the Chicago district plants of the Carnegie-Illinois Steel Corp. was unofficially reported last week.

At Gary works, three blast furnaces set new pig iron tonnage records in August. The No. 6 furnace made 24,416 tons of pig iron as compared with the previous high of 24,265 tons made in July, 1936. The No. 8 furnace broke its best previous performance of 31,693 tons established in July this year by producing 31,857 tons in August, while the 33,771 tons made by the No. 11 furnace was a new high over the 33,675 tons made in May, 1937.

At the Gary sheet and tin mills, 682,500 base boxes were produced in the tin house as compared with the old record of 668,020 base boxes established in May, 1937.

Gary works last month produced 370,000 tons of ingots, which, although not a new record, closely approached the March, 1929, production record of 377,000 tons.

In South Chicago, the mill there produced 289,911 tons of ingots, a new record, the best previous total being 283,146 tons last June. The 104,335-ton output of the 44-in. slabbing mill in August exceeded July's record of 100,006 tons, and the No. 8 blast furnace established a new production high by making 34,699 tons, compared with 34,272 in July. The total pig iron produced last month in South works amounted to 228,250 tons, the best previous monthly production totaling 227,701 tons in July.

The two plants combined broke last May's ingot production record of 637,788 tons by producing 659,016 tons.

Employment records also were shattered, Gary and South works each employed during August 4000 more than in 1929, when previous highs were established. About 18,000 are now on Gary works' pay roll while at South works, 15,000 are listed. In the sheet and tin mills, about 11,000 were on the rolls last month as compared with 6000 in 1929.

Experience has proved that it does not pay to utilize man power in handling loads of 500 pounds or less . . . The Lo-Hed Quarter-Ton Hoist—the original electric hoist of its capacity—was built specifically for loads too heavy for one or two men to handle safely, profitably . . . The new Lo-Hed catalog shows you its 21 features, tells about the 96 other *standard* Lo-Hed Hoists. Send for a copy.

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2410 Aramingo Avenue, Philadelphia, Pennsylvania

A-E-CO LO-HED Hoist

Other Products: A-E-CO Taylor Stokers, A-E-CO Hele-Shaw Pumps, Motors and Transmissions, A-E-CO Marine and Yacht Auxiliaries

Gentlemen: Please send me your complete new Lo-Hed catalog including an outline of how to easily and properly select a hoist for any requirement.

*Name of Company*_____

*Company Address*_____

*Your Name*_____

*Your Title*_____

German Iron Imports And Exports Rise

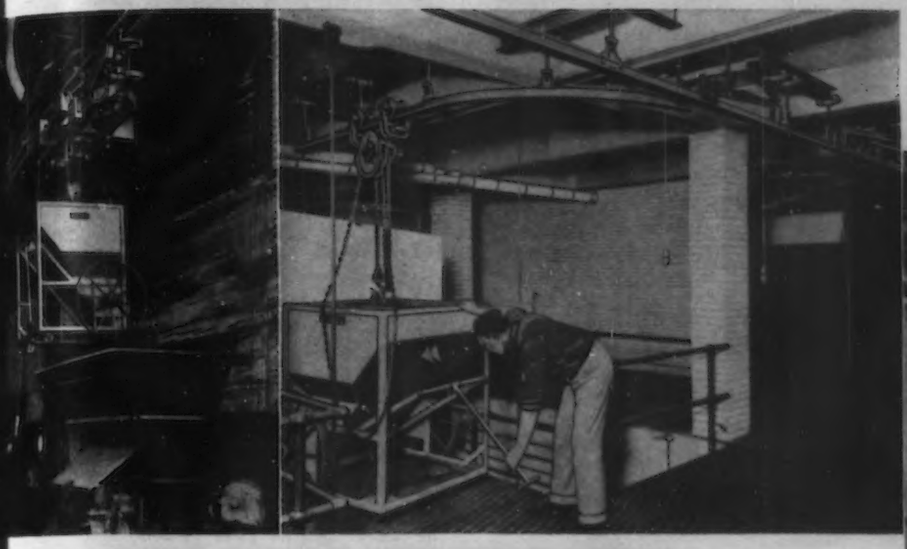
LONDON (*Special Correspondence*)—Germany's exports of pig iron and rolled iron products during the first half of 1937 showed an expansion in volume of about 60,000 tons, or about 43 per cent, at 1,407,032 tons. The value has advanced by 37,000,000 marks ($15,000,000), or about 24 per cent.

Statistics for the period illustrate a material change in the class of goods exported. Owing largely to Germany's own requirements, exports of pig iron and semi-finished goods declined to a proportion of 7.5 per cent of total exports, as against 16 per cent in 1936. The largest expansion in exports occurred to European countries.

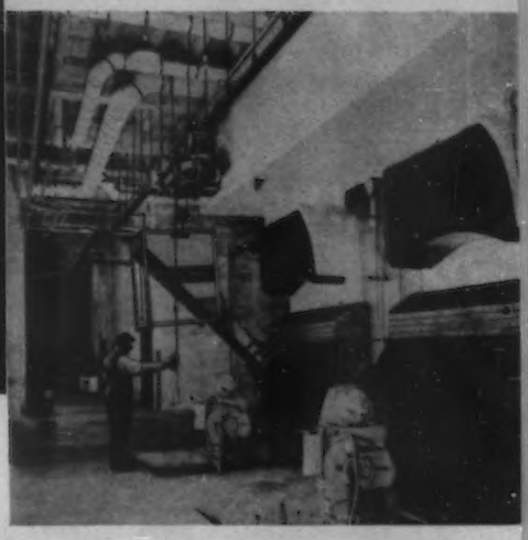
The average value per ton of iron exports during the half year was 136.32 marks, against 114.78 marks in 1936. Compared with the percentage advance in iron exports in other countries, the German advance was small. In the United States the rise in exports during the period was 160 per cent, while in Czechoslovakia it was 88.6 per cent.

At the same time, Germany's imports of pig iron have also risen. During August the increase was

CLEVELAND TRAMRAIL MATERIALS HANDLING EQUIPMENT



• Still time before cold weather to check up and put your coal and ash handling on an economy basis.



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• Cleveland Tramrail coal and ash handling equipment has been the solution of many boiler room problems.
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or Five Ton or Five HUNDRED TON Loads

Two installations of Cleveland All Welded Roller aring Cranes in heavy, continuous mill service.

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For PRECISE FORMING AND FINE FINISHES

SUPERIOR GALVANNEALED is extensively used for refrigerator shells and similar applications requiring precise forming and a highly rust-resistant foundation for fine finishes. This sheet has a zinc coating alloyed to the steel base by heat treatment. Its velvety surface is ideal for paint, lacquer, or enamel.

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OPEN HEARTH STEEL SHEETS

Superior Galvannealed
"Super-Metal"
Special Coated

Galvanized Sheets
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Hot Rolled Annealed,
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FOR EVERY MECHANICAL NEED

COIL SPRINGS
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WIRE SPECIALTIES
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MANY of the country's foremost manufacturers use American Springs exclusively—having adopted them after the most severe and rigid tests. Similar tests may prove to you that the dependability and uniformity of American Springs would form your strongest assurance against "spring failure" in your products.

SNAP RINGS
LOCK SPRINGS
SPECIAL SPRINGS
from Every Type of Wire up to & including ½ dia.

Send for Quotations
AMERICAN SPRING
AND MANUFACTURING CORPORATION
PARK AVE. HOLLY MICHIGAN

marked, owing to the sustained heavy demand by the iron foundries. This is stated in a report by the German Iron Producers' Association, but no figures of the increase are given.

Total production of raw steel in Germany during July was 1,656,625 tons, compared with 1,658,095 tons in June, a decrease of 1,470 tons. The average production per working day in July was 61,356 tons, against 63,773 tons in June.

Production of finished rolled goods fell by 19,771 tons to 1,183,273 tons, representing an average working day production of 43,825 tons, against 46,271 tons. Of semi-finished rolled goods, 87,008 tons were produced a reduction of 644 tons.

French Steel Exports Also Rise

A further advance in French iron and steel exports is shown by the July figures just issued. Exports of pig iron were 39,000 tons, against 4,600 tons in July, 1936. Total exports for the first seven months amounted to 216,000 tons, against 78,900 tons in the corresponding period last year.

France's steel exports have not yet regained their 1935 level, but were larger than last year. The total for the first seven months was 858,000 tons, against 720,000 tons in the corresponding period of 1936, and 970,000 tons in 1935.

A.S.M.E. Fall Meeting Planned for Erie

THE first national fall meeting of its kind is planned for Oct. 4 to 6 at Erie, Pa., by the American Society of Mechanical Engineers. Ten professional divisions are cooperating with the Erie local section in the presentation of papers relating to machine shop practice, management, power, fuels, oil and gas power, hydraulics, instruments and railroads. Headquarters will be the Hotel Lawrence.

Among the papers on machine shop practice are the following: "Better Electrical Apparatus with Minimum Welding," by A. P. Wood; "Machine Shop Practice Pertaining to Arc Welding and Steel Fabrication," by A. C. Cochrane; "Determining the Tool-Life Cutting-Speed Relationship by Facing Cuts," by Charles Kraus and R. R. Weddell; and "Power and Forces in Milling SAE 3150 Steel with Helical Mills," by O. W. Boston, W. W. Gilbert and K. B. Kaiser.

Papers relating to management are titled as follows: "Production Planning and Control" (four papers by W. A. Barr, E. L. Sheechy, E. W. Johnston and Thomas M. Landy, on Tuesday and Wednesday morn-

ings); and "Present Day Trends in Wage Incentives," by Merritt Lum. A paper on a "New Metal for High-Temperature Service," by R. S. Brown and C. L. Clark is to be read at the power session.

Plant visits are planned to the General Electric Co., the Erie Forge & Steel Co., the American Sterilizer Co. and the Hammermill Paper Co. in Erie and to the petroleum industry at Oil City, Pa.

British Steel Prices Again Under Fire

LONDON (*Special Correspondence*).—Lord Nuffield, Britain's biggest automobile manufacturer, renewed his recent protest against the present high steel prices at a dinner of automobile distributers in London.

"It is asked why we cannot produce a cheaper car," he said. "The steel manufacturers of this country are doing their best to get all they can from the present demand for steel. They are overcharging us.

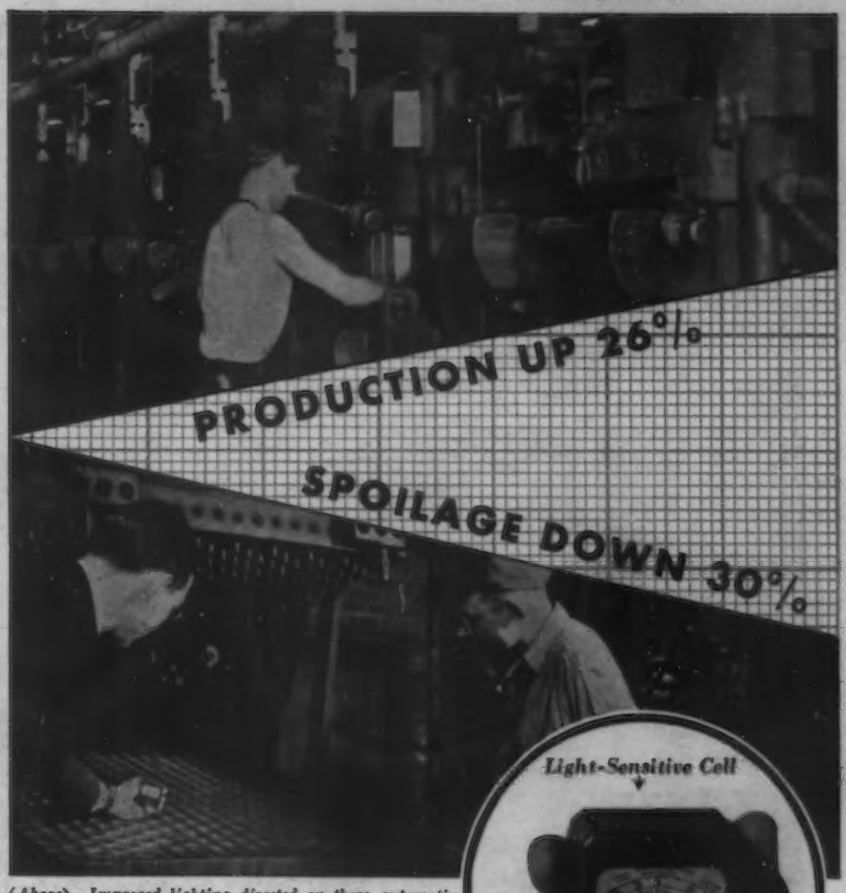
"One reply of the steel manufacturers is that various things have gone up by so much per cent. But they forget that they are doing 100 per cent more business, which should bring their costs down. Where is the profit going?"

The British Iron and Steel Federation and the Society of Motor Manufacturers and Traders declined to make any comment on Lord Nuffield's remarks. Both pointed out that negotiations are now proceeding between the automobile manufacturers and the steel makers with a view to solving the problems between them.

British steel manufacturers do not appear to be greatly concerned by Lord Nuffield's criticisms, although it is realized that he voices not merely an individual opinion, but that of the automobile trade. The steel industry, however, contends that prices have not been advanced as fully as increases in the cost of raw materials warrant. Further, the increases approved by the Import Duties Advisory Committee were made after full investigation of production costs.

Lord Nuffield's threat to purchase supplies of steel from abroad, probably the United States, does not at the moment worry the British industry, which has more work on hand than it can conveniently handle. Moreover, steelmakers doubt whether Lord Nuffield could secure material abroad, except at prices in excess of those ruling

(Below)—These machines mold rubber battery cases. Operators must see into the machines to place the charge and again to remove the finished case.



(Above)—Improved lighting directed on these automatic cent presses which turn out battery tops provides between 75 and 100 footcandles for easy, efficient seeing. The Lighting Engineer is checking it with his G-E Light Meter.

• The General Electric Light Meter quickly and accurately tells whether your plant is sufficiently lighted for safe, easy seeing. Costs only $11.50.

BETTER LIGHTING PUTS NIGHT PRODUCTION ON DAY BASIS

A modern lighting installation in the Aetna Rubber Company's Cleveland plant has put night-time production on a daytime basis.

According to Mr. E. J. Malek, general manager of the company, better lighting has helped increase night production so that total production is up more than 26% and at the same time over-all spoilage has decreased 30%. In addition, the factory is much more cheerful and safer to work in than formerly.

Perhaps better lighting can help increase production in your plant. See your local lighting company or nearest General Electric Lamp Division for help in improving your present lighting or in solving specific industrial lighting problems. And write to General Electric Co. Dept. 166, Nela Park, Cleveland, Ohio for a free copy of the illustrated booklet "Special Lighting Applications for Industrial Processes."

THEY STAY BRIGHTER LONGER

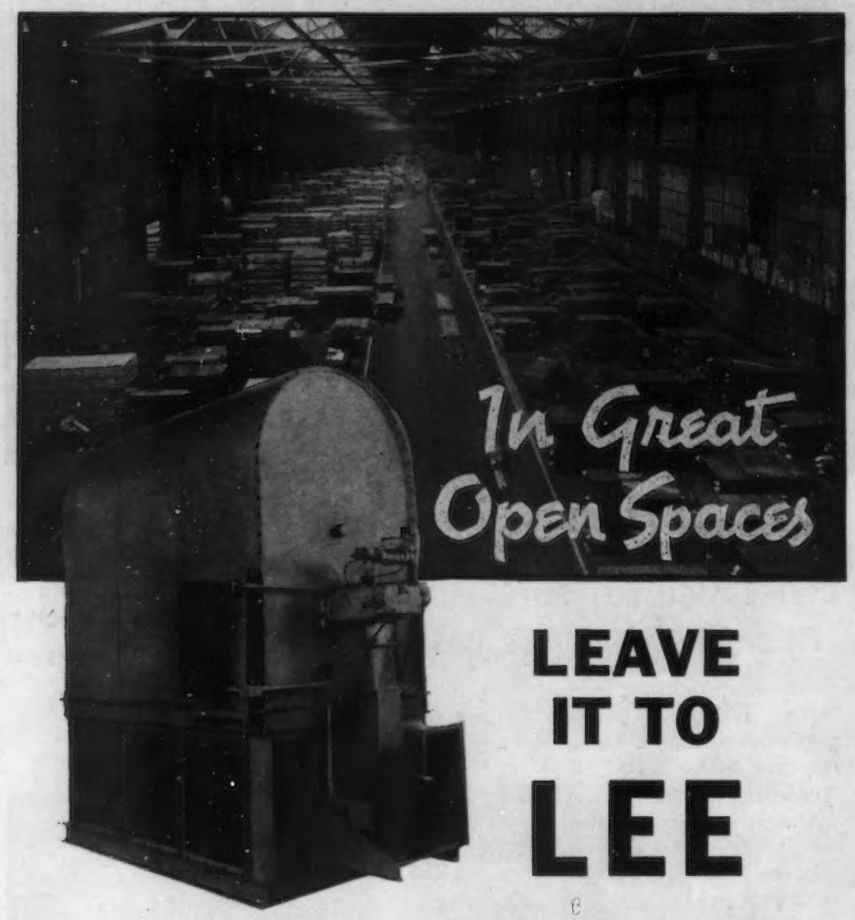
GENERAL ELECTRIC

at home and which are below the quotations of European and American exporters.

One reply which Lord Nuffield's criticism has brought forth is worthy of quotation. It is made by the Brymbo Steel Co., of Brymbo, near Wrexham.

"We fail to understand how Lord Nuffield can reasonably challenge the integrity of ruling steel prices," says the firm's statement. "The production costs of steel today are considerably higher than they have been, but the prices are very considerably lower today than they were in the boom year of 1921-22. At that time prices were based on supply and demand. Today prices are controlled strictly by audited cost of production.

"We believe that without the leadership and control of the British Iron and Steel Federation, steel prices might easily be 40 per cent higher than they are at present, due to the world shortage that exists, and not just the shortage in this country. It must be well known that it would be wholly uneconomic for our automobile industry to contemplate purchasing steels outside Britain."



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The ultimate goal of all heating systems is to warm the air. LEE does this *directly*, without roundabout conversion to other mediums, or through a mechanical maze.

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Doing its job in the simplest way, the LEE UNIT HEATER works most economically. It may operate manually, or automatically. It will use the fuel cheapest to your locality. In a system, it may be closed off or augmented at will, providing great flexibility to suit your demands, or the weather's.

To know more about LEE UNIT HEATER, ask for your copy of B737—just off the press.

DRAVO CORPORATION
Machinery Division
PITTSBURGH, PENNA.

3 of 4 Steel Workers Own Automobiles

THREE out of four steel workers now own cars, according to an estimate by the American Iron and Steel Institute based on information obtained from representative steel plants in Ohio, Pennsylvania and West Virginia.

Of the 157,000 steel workers covered by the study, approximately 117,000 owned passenger cars, it was indicated. If the ratio of car ownership found in these representative steel plants holds good throughout the industry, approximately 400,000 of the 533,000 steel workers now own cars.

Ownership of cars by wage earners in the industry is apparently at a higher level than ever before, the inquiry revealing that parking lots in most plants are generally more congested than at any previous time.

Personnel executives reported that a wave of car buying by steel workers began early in 1936 and has since been carried forward by gains in steel operations and in wage rates which have raised the current hourly earnings of steel workers nearly 35 per cent above the level of 1929. The larger amount of leisure time made available to steel workers through the reduction in the average work-week from 55 hr. in 1929 to about 40 hr. at present, together with the adoption of the five-day week and of vacations with pay, were also cited as factors in the increased car ownership.

The study also indicated that the possession of cars, coupled with improved public transportation systems and the shortening of the work-week, has permitted thousands of steel workers to move to rural or semi-rural surroundings at some distance from the mills in which they work. At plants located in agricultural areas as many as 10 to 15 per cent of the men own or lease farms, reports indicated, while as many as 35 to 40 per cent of the workers live in the country, the total in each category having shown a substantial increase since 1929.

The rise in the last 18 months to

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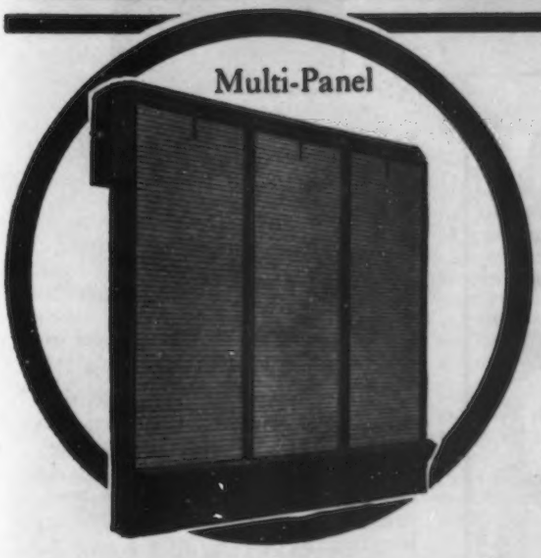
THE ROTO-CLONE
FOR PROCESS DUST

Roto-Clone combined exhauster and dust separator is now available in three types making it possible to work out systems of dust control that have the advantages of greater simplicity, increased efficiency, extreme compactness and lower operating costs.

Where re-circulation of air is practical, Roto-Clone is more effective in combination with either AAF Tubular Cloth or Airmat Dust Arresters. These three AAF dust collectors either in combination or used singly offer the most satisfactory and economical solution to process dust problems.



AMERICAN AIR FILTERS
FOR ATMOSPHERIC DUST

The Multi-Panel automatic air filter was orginally designed for steel mill service where the air cleaning problem is recognized as the most difficult within the scope of modern air filters. Multi-Panel combines highest efficiency in dust removal with positive self-cleaning and is applicable to the larger and better types of ventilating and air conditioning systems. Other American Air Filters for atmospheric dust control are the Unimatic self-cleaning air filter for smaller capacities from 1,000 to 30,000 c.f.m.; Viscous Unit Filters for various industrial operations where dust is either a nuisance or harmful such as in product drying, finishing, and the manufacture of food products affected by air borne contamination. Write for complete engineering data.

VISIT BOOTHS 6 *and* 7 *at the* MIDWEST POWER SHOW, CHICAGO, ILL. OCTOBER 4th *to* 9th

AMERICAN AIR FILTER CO., INC.
INCORPORATED
409 Central Ave., Louisville, Ky.

AMERICAN AIR FILTERS

what is generally believed to be a new high record in the proportion as well as in the number of automobile-owning steel workers is noteworthy in view of the fact that in the country as a whole, automobile ownership failed to keep pace with the rise in population from 1929 to 1937. Car ownership among steel workers appears to be considerably above the national average.

This widespread use of automobiles has made the parking problem serious at many steel plants, the problem becoming especially acute when the shifts change. Congestion is caused by the arrival of the new shift before the men whom they are relieving have left the plant. At such a time, a typical mill employing 6000 workers, in three shifts of 2000 each, may have as many as 1300 cars parked or arriving.

More Shearing Between Grinds

The only yardstick for measuring shear knife quality is the amount of tonnage each knife will yield before grinding becomes necessary. And in this regard, you will find AMERICAN shear knives to be unsurpassed... as numerous plant shopmen are daily experiencing in constant production.

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HOMESTEAD PENNSYLVANIA

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Something NEW!

Protect your workmen—avoid cleaning room dust by not creating any—and at the same time clean your product for less money. This new IDEAL Cascade Mill assembly cleans castings wet, delivers them dry, and one Pennsylvania foundry cut cleaning room labor 75% with it! Write for full description.

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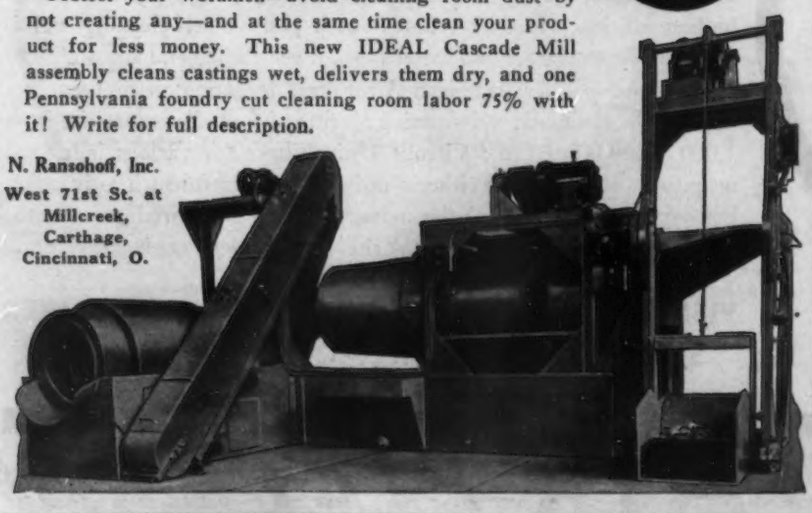

PERSONALS..

TOM M. GIRDLER, chairman of the board and president, Republic Steel Corp., has accepted an invitation to speak at the annual dinner of the Illinois Manufacturers' Association on Dec. 14.

❖ ❖ ❖

HOWARD V. HARDING, who since 1927 has been chief engineer of Peter Clark, Inc., New York, has been made New York district sales manager for Lukenweld, Inc., a division of the Lukens Steel Co., Coatesville, Pa. He will have offices at 120 Liberty Street. He started with the Hyde Windlass Co., Bath, Me., as a machinist's apprentice in 1914, later becoming a draftsman in the same organization. He joined the Mead-Morrison Co., Boston, in 1919 and two years later became associated with the Gifford Wood Co., Hudson, N. Y., where he was engaged in the design of materials handling equipment.

HARRY L. BRINDLE, whose appointment as acting general superintendent of the Edgar Thomson works of the Carnegie - Illinois Steel Corp. was announced in these columns last week.

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H. H. SMITH has been placed in charge of the Baltimore branch office of Steel & Tubes, Inc., subsidiary of Republic Steel Corp., Cleveland.

❖ ❖ ❖

LYMAN C. JUDSON, who has been identified with the electrode busi-

ness for the past 20 years, has been appointed electrode sales manager of the National Carbon Co., Inc., New York.

❖ ❖ ❖

MICHAEL V. BONOMO, president of the Institute of Scrap Iron and Steel, New York, has been appointed a member of the new Municipal Labor Board by the Mayor of Newark, N. J. He is one of three employer representatives on the board, the other two being W. J. WELLS, president of L. Bamberger & Co., and PETER A. SMITH, treasurer of the A. P. Smith Mfg. Co.

❖ ❖ ❖

T. E. MILLSOP, president of the Weirton Steel Co., subsidiary of National Steel Corp., has been elected to the board of the parent company.

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M. H. LEBOWITZ has been appointed chief inspector of Wood works, McKeesport, Pa., of Carnegie-Illinois Steel Corp. Mr. Lebowitz, who has been in the employ of the company for 14 years, was formerly foreman of the finishing department. GEORGE W. DOUGLAS, foreman of the warehouse and shipping department, will assume Mr. Lebowitz's former duties in addition to his own.

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J. H. KLEIN, JR., former Navy commander and the first American commanding officer of the dirigible Los Angeles, has been appointed director of inspection and standards at Delco brake division of General Motors Corp. He has been a member of the staff of Delco at Dayton. While engaged in the Naval air service, Commander Klein made the pioneer trip across the Atlantic aboard the Los Angeles, following the war, as a member of the U. S. Navy crew of officers who were observers. When the airship was commissioned as a United States craft, he was put in command. In his new work, Commander Klein will direct a standards laboratory which will check materials used in the manufacture of hydraulic braking equipment.

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GEORGE F. FISHER has been appointed manager of sales of the newly created construction materials division of the Tennessee Coal, Iron & Railroad Co., Birmingham. Mr. Fisher, a native of Pittsburgh, has been with the United States Steel Corp.'s subsidiaries for the past 15 years. His first two years were spent in Youngstown mills. For the next three years, he was on the sales staff of the Pittsburgh office of the Carnegie Steel Corp. In 1927, as a salesman, Mr. Fisher was transferred to New Orleans, from where he traveled in Louisiana and Texas until 1935, when he was transferred to the Tennessee company. Making his headquarters in Chattanooga, he has traveled in Tennessee for the past two years. His new duties will take Mr. Fisher to Birmingham, where he will make his home.

❖ ❖ ❖

WALTER and CLARENCE FISHLEIGH, Detroit consulting automotive engineers, have been working with designers, engineers and production men of the American

TRIPLE COMPRESSION
SCRAP BALERS

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100 TC
(100 x 51 x 36)
and other sizes

Also Regular
Double
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in all sizes

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COMPLETE LINE OF BALERS: Electric and Hydraulic, also HYDRAULIC PRESSES AND PUMPS

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Grilles of unusual beauty in exclusive designs suitable for public and commercial buildings and private homes. Ornamental sheets for radiator enclosures and metal furniture are furnished of any metal. Write us for prices and samples.

ANY METAL ANY PERFORATION

The Harrington & King PERFORATING Co.
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Bantam Car Co., Butler, Pa., completing production plans for the new Bantam trucks and passenger cars.

❖ ❖ ❖

EMIL N. FABBRO, formerly with the Packard Motor Car Co., has been added to the staff of Mechanical Engineering Service Corp. in Detroit. Mr. Fabbro took up the new position upon his return from an extended honeymoon, his bride being GENEVIEVE ZUBE, assistant national secretary of the American Society of Tool Engineers.

WILLIAM MCWANE, president of the McWane Cast Iron Pipe Co., has been appointed chairman of the industrial division for Birmingham's annual Community Chest Appeal. JOHN W. MINOR, with the sales department of the Republic Steel Corp., has been appointed assistant chairman.

❖ ❖ ❖

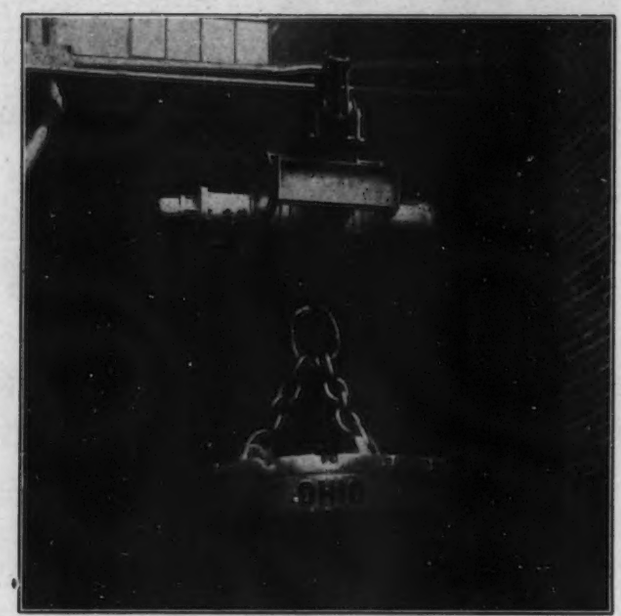
VICTOR W. BONE, managing director, Ruston-Bucyrus, Ltd., Lincoln, England, affiliate of Bucyrus-Erie Co., South Milwaukee, Wis., and its sales agency for much of its export trade in excavation machinery and large dredging equipment, has been spending a fortnight in conference with WILLIAM W. COLEMAN, president, and other Bucyrus-Erie executives at the head office in South Milwaukee.

❖ ❖ ❖

FRANCIS W. MAGIN, president, industrial controller division, Milwaukee, of the Square D Co., Detroit, has been elected a director of Hein-Werner Motor Parts Co., Waukesha, Wis.

(CONTINUED ON PAGE 100)

AN OLD OHIO MAGNET STILL GOING STRONG



This Ohio Magnet was sold in 1920. It is just ready to return to original buyer after moderate repairs as follows:

Remachine all fits—reinsulate coil—supply new manganese steel bottom plate—terminal insulation and leads and reassemble.

It is good now for many more years of profitable service.

Ohio Magnets are better than ever. Have you a magnet problem we might help to solve?

THE OHIO ELECTRIC MFG. CO.

5908 Maurice Ave. Cleveland, Ohio

Meeting To Discuss Highways Design

PLANS for improving highway design, particularly within the limited areas of congested cities, will be discussed at a special dinner meeting to which invitations have just been sent out by the American Institute of Steel Construction, New York. Representatives of the automobile manufacturers, automobile owners, highway engineers, city engineers, city planners, architects, roadbuilders have been invited to attend and participate in the discussions. The meeting will be held Tuesday evening, Sept. 21, at the Waldorf-Astoria Hotel, New York. Clyde G. Conley, president of the institute, will preside.

Tool Engineers Form Rockford Chapter

A NEW chapter of the American Society of Tool Engineers has been formed at Rockford, Ill., consisting of a charter membership of about 100. The organization meeting was held at the Faust Hotel, Rockford, Friday evening, Sept. 10. During the day all Rockford plants held open house for the new members of the society and the national officers who were present.

Ford Lamb, executive secretary of the society, says that new chapters will soon be organized at Flint, Mich., Baltimore, Md., and New York.

The Detroit chapter opened its fall activities with a meeting which was addressed by William A. Hart, chief engineer of the Colonial Broach Co., Detroit, who told the story of broaching from its earliest stages. His paper was illustrated by lantern slides, which included early tools and machines and photographs of present-day installations.

Fansteel Metallurgical Corp. President Condemns NLRB Report, Which Gives Back Pay to Men Who Went to Jail for Sitdown

A REPORT by a trial examiner of the National Labor Relations Board holding the Fansteel Metallurgical Corp., North Chicago, Ill., at fault for the sitdown strike in its plant last February was severely criticized by Robert J. Aitchison, president of the company, who termed the report as being "written in utter disregard of the record facts and evidences the examiner's complete lack of understanding of industrial relations."

Tilford E. Dudley, the examiner, ordered the company to reinstate 83 dismissed employees, 59 of whom participated in the strike, and to pay $70,000 in back pay to 67 of the workers.

Mr. Aitchison's full reply to the report is as follows:

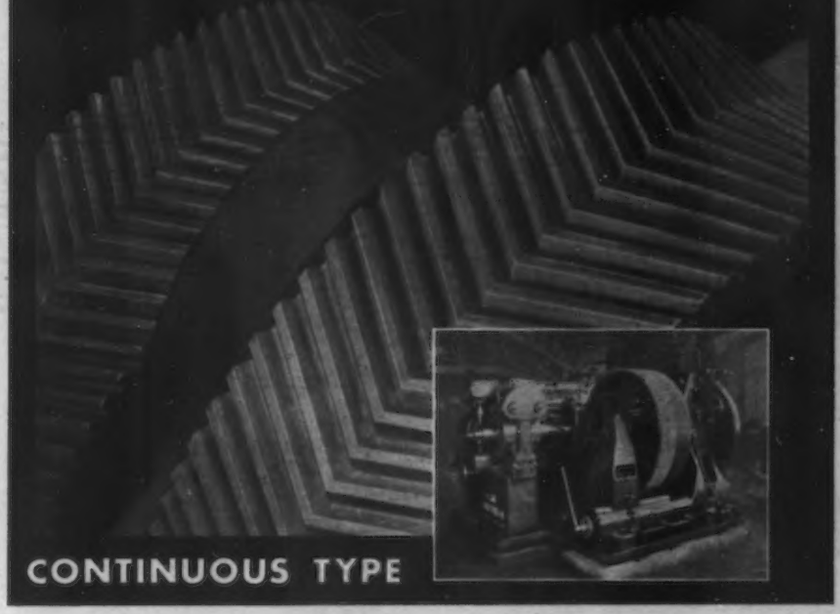
"We will promptly file exceptions to the intermediate report filed by the trial examiner for the National Labor Relations Board. The exceptions will rest squarely upon the company's proper right to discharge the men who seized its plant and destroyed its property during the so-called sitdown strike in February last. The examiner's report, which is over 50 pages in length, completely ignores and makes no reference to the primary issue of illegality of sitdown strikes. Yet, by recommending the reinstatement of the men who were discharged for participation in the sitdown and who were held in contempt by the Circuit Court of Lake County and sentenced to jail, the trial examiner, in effect, approves and condones the illegal conduct in seizing the plant.

"In imposing fines and jail sentences on 36 of the men whom the trial examiner now seeks to have reinstated, the Circuit Court of Lake County specifically held the sitdown strike illegal as has every other court that has considered the question since that time. The report is in direct conflict with all of these decisions. In view of the condemnation of the sitdown strike by the President and members of his Cabinet, it is strange to see one of the subordinate officers of the Federal Government supporting its use.

"The report recommends that the reinstatement be with back pay. It is interesting to speculate as to whether the examiner intended that the men sentenced to jail should be paid for the time they have already served in jail and may hereafter serve when a pending appeal is disposed of.

"The report was written in utter disregard of the record facts and evidences the examiner's complete

HERRINGBONE GEARS



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Industrial Gears and Speed Reducers
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PHILADELPHIA

lack of understanding of industrial relations.

"We intend to take all necessary legal action to set aside the trial examiner's recommendations. We are satisfied that in his endorsement of the sitdown strike and in his report generally, the trial examiner will be properly rebuked by the courts."

Of the plant's 260 employees, 87 per cent are members of the Rare Metal Workers of America, an independent union formed after the strike, which is now recognized as exclusive bargaining agent by the company. Dudley, in his report, ordered recognition of this union withdrawn and asked that the company bargain collectively with the CIO upon its request.

FTC to Tighten Rules On "Cease" Orders

WASHINGTON, Sept. 14.—Taking steps to tighten the enforcement of its cease and desist orders, the Federal Trade Commission on Monday indicated it may hereafter require frequent compliance reports from firms found guilty of violations.

Rule 22 of the Commission's procedure has been revised by the addition of the following:

"Within its sound discretion the commission may require any such respondent or respondents from time to time thereafter, to file further reports in writing, setting forth in detail the manner and form in which they are complying with the said order."

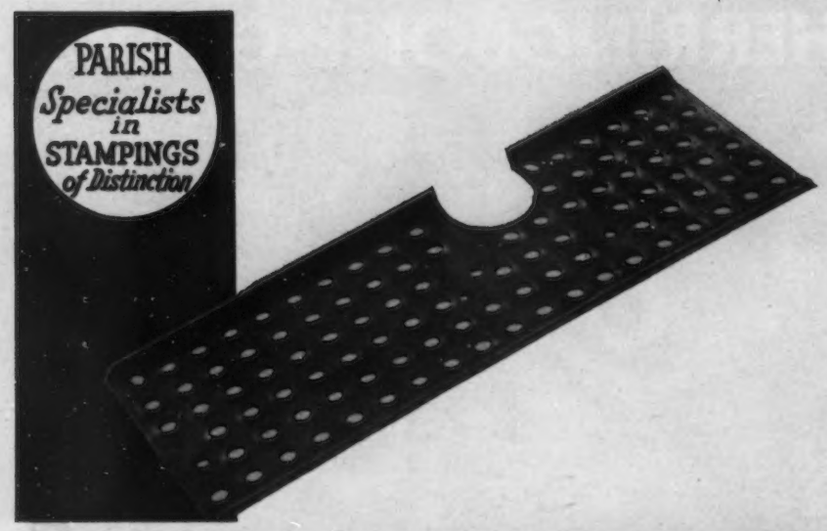
Heretofore, the commission has required only one report filed within a specified time following issuance of a cease and desist order. The commission's action is understood to be the result of instances where the violators resorted to the practices complained of after having made the required report on compliance.

$70,000,000 Building Program Approved

WASHINGTON, Sept. 14.—Made up of relatively small individual units, whose steel requirements generally will be light, the Treasury and Post Office Departments last Thursday announced joint approval of 319 public building projects authorized under a three-year $70,000,000 emergency construction fund which was appropriated at the recent session of Congress. Most of the projects are post offices. The announcement said work would "go forward immediately" with the Treasury acquiring sites where necessary and drafting specifications. Bids for construction contracts are advertised through the Procurement Division of the Treasury Department.

Track Shipments Decline in August

SHIPMENTS of trackwork for T-rail track of 60 lb. per yd. and heavier declined from 8252 net tons in July to 7530 tons in August, according to the American Iron and Steel Institute. The August volume was well above the August, 1936, figure of 6401 tons, however, and was the best August volume since 1929. For the eight months' total, the 69,790 tons shipped compared with 47,209 tons in 1936, and exceeded the entire year's shipments of 68,813 tons. The 1929 shipments were 162,115 tons.



Safety for the Brakemen

Neither the gauge, size nor specifications of a stamping presents any obstacle to Parish. Skill, experience and equipment combine to make difficult stampings comparatively easy in Parish shops.

This non-skid brake step for box cars is 1/4" thick x 30" long x 10" wide. The flange is 1". Embossing around the holes makes the step non-skid. Another of the many types of stampings produced by Parish for many industries.

Have you a problem that could be worked out in pressed metal? Our engineers will do it for you.

PARISH PRESSED STEEL CO., Reading, Pa.
PACIFIC COAST REPRESENTATIVE
F. Somers Peterson Co., 57 California St., San Francisco, Calif.

12,000 Tons of Steel For New Ship; Government Will Not Build Fleet

WASHINGTON, Sept. 14.—It is estimated that about 12,000 tons of steel will be required for the 34,000-ton ship for which the Maritime Commission will receive bids tomorrow. The proposed vessel is of the commission's own design and is to be built for the United States Lines., New York, to replace the retired Leviathan. It will be of the Manhattan and Washington type, 723 ft. in length and a breadth of 92 ft.

Bids have been asked on both a fixed sum basis and an adjusted price basis, the latter to be subject to adjustment on account of changes in the cost of labor and material, providing any resultant increase in cost does not exceed 15 per cent. No bid will be considered which fixes the time for completion of the vessel beyond 852 days.

Meanwhile, further delay in the entire American merchant marine program looms over pointed difference just brought to a head between ship operators and the commission. Already knee-deep in labor difficulties due to the CIO-AFL tussle, the commission's latest warning is that a crisis is threatened because of the "apparent inability" of some private operators to finance their share of construction costs. Refusing to make a definite commitment as to whether any of the 300 or 350 new ships included in the program would be built, Chairman Joseph P. Kennedy strongly insisted that the Government intended neither to operate the fleet nor "build it free of charge" for private operation.

His announcement of a threatened crisis was based on a correlated survey by the commission of the shipping industry, results of which probably will be made public about Oct. 1. Mr. Kennedy said the report will show the financial ability of steamship lines and will contain recommendations for consolidations.

Commission members were aroused over criticism by reports that New York steamship owners expected the commission to build new ships and offer them for charter to American shipping companies. The ship owners, it is reported, said that Government building would eliminate the controversy over foreign and domestic construction differentials, the ships would have the extra speed and gun platforms to make them a wartime naval auxiliary and the companies which operate them without subsidies would do so as private concerns, paying the Government rent for the vessels and use them on a competitive world basis.

At the commission it was stated that this attitude represented an "about-face" by shippers and was "conceived as propaganda to conceal the true state of their financial responsibility."

The impasse developed just as Chairman Kennedy had completed the initial proposal for 95 passenger and cargo vessels to cost $256,440,000.

Newport News Shipbuilding & Dry Dock Co. moved the offices of the following executives from New York to Newport News, Va., on Sept. 1: Roger Williams, vice-president; James Plummer, purchasing agent; H. K. Peebles, assistant purchasing agent; D. G. Moorhead, hydraulic sales engineer. The treasurer and a representative of the vice-president's office will remain in New York, also J. M. Clawson, assistant purchasing agent.

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GRAPHITE is incorporated in this outstanding, tough, durable, INSUROK CG Plastic Bearing—the graphite content remaining throughout the life of the bearing. With an extremely low coefficient of friction, INSUROK CG Bearings (non-metallic) reduce power losses; resist the action of most chemicals, oils, solvents, acids and reagents; withstand the severest usage under most destructive conditions of wear, abuse and neglect. The ideal bearings for large or small machinery and power transmission equipment, INSUROK Bearings give dependable, trouble-free service at the lowest cost per year.

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Scrap Embargo Bill Would Not Pass Congress, Says Senator Sheppard

WASHINGTON, Sept. 14.—Expressing doubt that the pending scrap licensing bill will receive Congressonal approval next session in view of the opposition from Secretary of State Hull and other Government department heads, Chairman Sheppard, of the Senate Military Affairs Committee, on Saturday made public the transcript of recent scrap hearings together with confidential reports from four Government departments on the subject.

At the same time, the Senator announced that the scheduled scrap hearings, which had been called off after interested parties had requested more time in which to prepare their cases, definitely will be resumed when Congress reconvenes in January. Earlier in the week, Chairman McReynolds, of the House Foreign Affairs Committee, indicated he would press for a scrap embargo bill during the coming session. McReynolds sponsored the tin plate scrap licensing law which is being administered by the National Munitions Control Board headed by Secretary of State Hull. Senator Nye, Republican, of North Dakota, has announced an investigation will be made at the next session of Congress of profits of scrap exporters.

Publication of the reports to the Senate Committee disclosed that the committee had sought information on the proposed scrap ban from the Department of Interior, the Department of Justice, the United States Tariff Commission and the Federal Trade Commission. Recommendations from the Secretaries of State, War, Navy and Commerce previously had been published.

Out of all departments reporting, only the War and Navy Departments favored enactment of the legislation, although substantially all endorse the Bridges-Berry resolution calling for a comprehensive investigation by a joint Congressional committee of "the natural resources of iron ore and the domestic supplies of iron and steel scrap necessary for domestic use."

Hull, however, was only lukewarm to the proposal and strongly intimated that the study already conducted by his Interdepartmental Committee would be adequate and made the further investigation unnecessary. He told the committee last May that the export movement of scrap had created no emergency situation and that there is "no actual or prospective shortage of scrap." He added that the disadvantages of direct and indirect restrictive action, as embodied in the Schwellenbach-Kopplemen bill, would "outweigh the possible advantages."

Says Scrap Embargo Would Not Stop Armament Race

Of the reports on the scrap licensing measure that were not heretofore made public, the Interior Department's letter, signed by its Acting Secretary, Charles West, informed the committee that withholding scrap shipments from foreign countries "will not stop nor greatly retard the building of armaments." The letter added:

"From a peacetime standpoint, I do not see the immediate necessity of enacting a bill so at variance with the general commercial policy of the Administration aimed at lessening restrictions on trade, both import and export. From the standpoint of national defense, the powers given the President in times of

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This casting — a steel stern frame—typifies the class of difficult steel castings produced by Standard. Prompt service in the production of steel castings and heavy forgings is made possible by our ample equipment and broad experience.
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STANDARD STEEL WORKS CO.
Subsidiary of the Baldwin Locomotive Works
BURNHAM PENNA.
STANDARD

stress would doubtless include all those proposed in the present bill."

The United States Tariff Commission, submitting results of a comprehensive survey on the subject reported that "no immediate national difficulties are being created by the recent exports of iron and steel scrap." Conceding that scrap exports during the first four months of this year have exceeded those for any preceding comparable period, the commission said the situation warrants further study. "Restriction of scrap exports by, and rearmament programs of, many foreign countries are factors which likewise deserve continued consideration," the report added.

The Tariff Commission forecast, however, that if the exports of iron ore, pig iron and scrap are controlled, "there might be a greater demand for the higher price rolled products of the iron and steel industry."

Attorney General Homer Cummings told the committee the Schwellenbach measure involves questions of legislative policy "to which I prefer not to offer any suggestions."

Included also in the record was a statement from Dr. Jacques C. Maguite, who unofficially spoke on behalf of importers of China, comprising principally cooperatives and blacksmith shops. Dr. Maguite, discussing the labor problem involved, pointed out that over 200,000 persons are dependent upon the scrap industry for a livelihood, tens of thousands of whom have "come off relief rolls because of the active and open scrap markets." He declared that an embargo on such shipments would throw many of them back on relief rolls "at a time when the Government is trying to reduce relief expenditures."

"With reference to the long range view, there is no danger of a shortage of scrap," Dr. Maguite asserted. "This question can be viewed from two angles: In the first place, there are in use today approximately one billion tons of steel articles, which represents the backlog of the scrap industry. This tonnage is in many forms, such as 28,000,000 registered automobiles, 100,000,000 tons of railroad equipment, etc., in use today, which must be continually replaced.

"At a conservative figure, about 2½ per cent of this tonnage is available for the scrap heap every year, which would amount to approximately 25,000,000 tons. We only used from this pile of one billion tons approximately 15,500,000 tons, which was collected by dealers last year; this left an exportable surplus of almost 10,000,000 tons, so that it was not alarming when we shipped out about 2,000,000 tons of scrap last year."

In addition to endorsing the pending scrap licensing bill, both the War and Navy Departments favored the study contemplated in the resolution sponsored by Senators Bridges, of New Hampshire, and Berry, of Tennessee. "Steel is one of the basic commodities of national importance in event of war," Secretary of War Woodring wrote the committee. "The preservation of this industry and conservation of the raw materials are important considerations of the national defense."

At the recent scrap hearing, Senator Bridges, joint sponsor of the resolution and a member of the Military Affairs Committee, declared that 50 per cent of scrap exports are going to "one single foreign country." "In the 11 years' period from 1923 to 1933," he pointed out, "our exports of scrap iron and steel averaged less than 300,000 tons a year, while during the last six months we have exported nearly seven times as much as we shipped in any one of those normal years. At that rate if no restriction is placed on the exportation of scrap iron and steel, we will send abroad this year, in 1937, more than we exported in all of those 11 years."

No More Tramp Iron

This huge safety trap spout type magnetic separator built for a large coal dock operator to eliminate tramp iron is one of many styles of better engineered magnetic separation equipment built by STEARNS.

If you have a similar problem, tell us whether you desire spout or belt magnetic treatment, give width of either and capacity in tons per hour.

We will be glad to explain a sure, economical method of taking tramp iron out of your material.

Write for our interesting Bulletin 100.

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STEARNS MAGNETIC MFG. CO.

FORMERLY MAGNETIC MFG. CO.

635 S. 28th ST. **MILWAUKEE, WIS.**

Separators **Clutches** **Magnets**

Standards Bureau To Study Materials For House Construction

WASHINGTON, Sept. 14. — Technical information from every available source for Government agencies on the engineering properties of building materials as incorporated in the structural elements of a house, with particular reference to low-cost housing, is the general objective of a research program just undertaken by the Bureau of Standards. Granted $198,000 by Congress to make the study, the bureau is formulating the program with the advice of representatives of the housing agencies of the Government, says *Technical News Bulletin*, published by the bureau.

"The sub-committee on design and construction of the Central Housing Committee has designated a special group to cooperate with the bureau on this program of technical research. The group consists of Harold D. Hynds, chairman, C. W. Chamberlain of the Procurement Division, Pierre Blouke of the Home Owners Loan Corp., Walter Junge of the Federal Housing Administration, Charles Mayette of the Public Works Administration, Vincent B. Phelan of the National Bureau of Standards, Colin O. Skinner of the Resettlement Administration, George W. Trayer of the Forest Service, Capt. Ellsmere J. Walters of the Quartermaster Corps of the Army.

"The conduct of the program is entrusted to a committee of bureau division chiefs, P. H. Bates, H. C. Dickinson, H. L. Dryden, W. E. Emley, G. E. F. Lundell, A. S. McAllister, and H. S. Rawdon, under the chairmanship of H. L. Dryden, who is designated as coordinator of the program.

"The detailed programs of the studies on bearing walls, partitions, floors, roofs, heating and ventilating equipment, and plumbing, suitable for use in low-cost housing are now being prepared. Conferences have been held between designated representatives of other Government agencies and selected groups of bureau personnel on the structural properties of low-cost construction; thermal insulation, moisture condensation, and heating and ventilating problems; plumbing; corrosion of steel; weather-tightness of roofs; finish floors; building papers and boards; wiring and lighting.

"A general statement has just been released outlining the objectives, procedure, and scope of the program. Copies of this statement, Letter Circular LC502, Research Program on Building Materials and Structures, 1937-38, may be obtained from the bureau on request."

The Bottle Neck is Gone!

The break in the production schedule was traced to an excessive number of rejects in the metal finishing department. The trouble was then located in the cleaning operations. The metal cleaner that had been doing well enough would not stand the "gaff" of the increased production. A Wyandotte Service Man happened along and we let him take a shot at it. He hit it the very next day! Don't know why I didn't think of Wyandotte in the first place!

●

May we co-operate with you, Too?

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Rich Iron Deposits Discovered in Poland

LONDON (*Special Correspondence*).—Deposits of iron ore which will help to make Poland independent of her large imports from abroad, especially Sweden, have been discovered at Zableza, near Tarnow, in the foothills of the Carpathian Mountains.

The ore, containing 40-60 per cent metal, is claimed to be of the same quality as that coming from Sweden. It is officially stated from Warsaw that the deposits which are now being tested, are likely to be workable.

Italy's Imports of Iron and Steel Gain

ITALIAN foreign trade in iron and steel products during the first half of 1937 followed an upward trend and topped the totals reached in the corresponding period of 1936, according to a report to the State Department by Lester L. Schnare, American Consul, Milan, and made public by the Bureau of Foreign and Domestic Commerce.

Imports of those materials into Italy during this period totaled some 105,000 tons in registering a 45 per cent increase over receipts in the first half of 1936. The bulk of this trade was in steel ingots and blooms, iron and steel bars, and rods, it was reported. Exports totaled some 33,000 tons, or 30 per cent more than in 1936 and were mostly iron and steel bars, rods, plates and sheets. No steel ingots or blooms were exported, probably because of the high local demand, coupled with the existing European pig iron shortage, it is stated.

Coming Conventions

Sept. 20 to 22—American Gear Manufacturers Association, Spink-Wawasee Hotel, Lake Wawasee, Ind. J. C. McQuiston, Penn Lincoln Hotel, Wilkinsburg, Pa., secretary.

Sept. 27 to Oct. 1—American Gas Association, 19th annual convention, Cleveland. A. Forward, 420 Lexington Avenue, New York, managing director.

Sept. 30 to Oct. 1—American Foundrymen's Association, fall technical conference, Columbus, Ohio. C. E. Hoyt, 222 West Adams Street, Chicago, secretary.

Oct. 7 to 9—Society of Automotive Engineers, second annual Aircraft Production Meeting, Los Angeles. J. A. C. Warner, 29 West 39th Street, New York, secretary.

Oct. 8 to 9—American Foundrymen's Association, St. Louis chapter regional conference, Missouri School of Mines, Rolla, Mo. J. W. Kelin, 4041 Park Avenue, St. Louis, secretary.

Oct. 11 to 12—Porcelain Enamel Institute, seventh annual meeting, Chicago, to be followed by the annual forum at Ohio State University, Columbus, Ohio. R. G. Calton, 612 North Michigan Avenue, Chicago, president.

Oct. 11 to 15—National Safety Congress and Exposition, Kansas City municipal auditorium. Headquarters of National Safety Council is at 20 North Wacker Drive, Chicago.

Oct. 14 to 16—Electrochemical Society, Inc., 72nd general meeting, St. Louis. Dr. C. G. Fink, Columbia University, New York, secretary.

Oct. 18 to 22—National Metal Congress, held under the auspices of American Society for Metals, American Welding Society, Iron and Steel and Institute of Metals Division, A.I.M.E., Iron and Steel and Machine Shop Practice Divisions, A.S.M.E., Atlantic City Auditorium, Atlantic City, N. J. Information may be secured from W. H. Eisenman, 7016 Euclid Avenue, Cleveland, secretary, A.S.M.E.

Oct. 26 to 29—American Institute of Steel Construction, fifteenth annual convention, Greenbrier Hotel, White Sulphur Springs, W. Va. Business sessions will be held in the morning, forums and group conferences in the afternoon. V. G. Iden, 200 Madison Avenue, New York, director.

Oct. 27 to 28—Coal divisions meeting, A.I.M.E., William Penn Hotel, Pittsburgh. A. B. Parsons, 29 West 39th Street, New York, secretary.

Nov. 3 to 5—National Foreign Trade Council, Inc., 24th convention, Cleveland Hotel, Cleveland. Lindsay Crawford, 26 Beaver Street, New York, secretary.

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First select a test paper of the desired pH range. In this illustration, the pH paper selected is for white nickel solution with pH between 5.2 and 6.7.

Dip the paper well into the solution so that all color bands are immersed. A quick dip of about one second is all that is necessary.

Remove, shake off excess solution and hold up to the light to compare. Beginners may obtain better results by placing the wet paper on a glass plate.

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PERSONALS

(CONTINUED FROM PAGE 92)

GEORGE H. BENDELL has been appointed superintendent of the Waukegan plant of the American Steel & Wire Co. to succeed the late W. E. Acomb. He has been assistant superintendent. S. R. Snow, who has been foreman of the wire mill, has succeeded Mr. Bendell as assistant superintendent. Mr. Bendell has been connected with the U. S. Steel Corp. since 1907, having started with the Illinois Steel Co. as an inspection clerk. Since that time he has held many positions with the company. He went to the American Steel & Wire Co. last year, when he was appointed assistant superintendent of the Waukegan works. He was born in Hammond, Ind., in 1891, but when he was quite young his family moved to Chicago, where he received his education. He is a member of the American Society for Metals. Mr. Snow has been with the American Steel & Wire Co. for 15 years in Waukegan. He started with the Wire company in 1912 at the Dekalb, Ill., works.

❖ ❖ ❖

WILLARD S. HARING, since 1929 vice-president in charge of Western sales for the Alan Wood Steel Co., Conshohocken, Pa., will come East about Sept. 20 to take charge of the sales department, succeeding ARTHUR L. MEYER, who has resigned. Before going to the West Coast, Mr. Haring was general manager of sales in Conshohocken for several years. P. L. FRANCIS, formerly district manager at Seattle for the company, has been made district sales manager for the office.

Short-Lived Strike At Johnstown Plant

PITTSBURGH, Sept. 14. — A strike of some employees of the Conemaugh & Black Lick Railroad, a connecting line of Bethlehem Steel Co.'s Cambria plant, Johnstown, Pa., ended yesterday. It was the calling of this strike which brought about a partial walkout of union steel employees last June, when the Steel Workers' Organizing Committee called the men out on a "sympathy" strike. Although the railroad employees' union claimed that a strike has been in progress, the steel company has maintained normal movement over the shuttle line which connects its plant with the Pennsylvania Railroad.

The SWOC walkout has never been called off, although the Cambria works has been back to normal operations for the past few months. The National Labor Relations Board is at the present time conducting a hearing near Johnstown covering charges of Wagner Act violations against Bethlehem Steel Co. The NLRB is attempting to prove that the company dominated the plan of employee representation.

Meanwhile the NLRB's hearing against Weirton Steel Co. at New Cumberland, W. Va., was enlivened somewhat yesterday by the announcement of the Weirton Employees' Security League that its headquarters had been broken into and an attempt made to take league records from the safe. It is this organization which the SWOC claims is a company-sponsored union.

Testimony now being taken in the Weirton hearing involves the questioning of employee representation members regarding expenses and time paid for, while serving as representatives. When company counsel objected to such questioning on the grounds that SWOC refused to produce its records, the objection was overruled by the NLRB examiner.

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Consumers' Goods Create New Peak In Steel Sheets, Strip, Tin Plate

RECORD-BREAKING demands, largely from industries manufacturing consumers' goods, created new peaks of production in steel sheets, strip and tin plate in the first six months of 1937, it is indicated by a report issued by the American Iron and Steel Institute. Steel bars and seamless pipe, used chiefly by durable goods industries, were also produced in record tonnages.

All other major products showed substantial increase over output in the corresponding period of last year. During the half-year period, a total of 22,345,820 gross tons of finished steel was produced for sale by the industry, a tonnage which closely approximates the volume of shipments during the period. The total represented an increase of nearly 30 per cent over the output in the same period of 1936.

A total of 4,411,516 gross tons of sheet steel was shipped during the first half of 1937, or more than 63 per cent of the record annual sheet output of 6,995,905 gross tons, established in 1936. Producers of consumer goods, such as automobiles, farm equipment and house furnishings, take about 74 per cent of the sheets that can be traced to destination, it is estimated.

Shipments of strip steel during the first six months amounted to 1,727,311 gross tons, or 53.5 per cent of the record annual output of 3,224,916 gross tons, also established in 1936. More than 85 per cent of strip steel shipments which can be traced to destination go into consumers' goods. Shipments of sheets and strips in the first half of this year were respectively 34 per cent and 23 per cent above the tonnages shipped in the first half of 1936.

Shipments of tin plate aggregated 1,253,970 gross tons in the first six months of 1937, equal to about 60 per cent of the record total of 2,103,153 gross tons, produced in 1936, and an increase of 27 per cent over shipments in the first half of 1936.

Total shipments of seamless steel pipe in the first half of this year reached 873,073 gross tons, excluding mechanical tubing, equal to nearly 70 per cent of the total of 1,254,499 gross tons produced in the record year 1936. The half-year total exceeds by 41.5 per cent the tonnage shipped in the first half of last year.

A total of 3,594,916 gross tons of steel bars, including bars for concrete reinforcement, were shipped during the first six months. This tonnage represents an increase of 31 per cent over the first half of last year.

Steel & Wire Co. To Expend $4,000,000

AMERICAN STEEL & WIRE CO. has taken the first steps toward embarking upon a $4,000,000 rehabilitation program for its Cuyahoga works in Cleveland with a letting of contracts for the erection of five additional buildings. These will consist of a warehouse, 80 x 576 ft.; an annealing room, 80 x 144 ft.; cleaning building, 80 x 648 ft.; storage building, 65 x 480 ft., and a building for stainless steel, 80 x 432 ft. The buildings will be erected by the American Bridge Co., U. S. Steel Corp. subsidiary.

Although work on this project is to get under way shortly, it will not be completed for approximately 18 months owing to the fact that operation in the departments affected will be carried on as usual while construction is in progress.

Sweethearts,
AND HERE'S ANOTHER
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PALMOLIVE
BALDWIN DUCKWORTH

FABRICATED STEEL

NORTH ATLANTIC STATES

New York, 190 tons, St. Andrews Roman Catholic Church, to Post & McCord, New York.

Brooklyn, 320 tons, Jewish Sanitarium and Hospital for Chronic Diseases, to Simon Holland & Son, Inc., Brooklyn.

Brooklyn, 1000 tons, school No. 252, to Post & McCord.

HOW MORSE ROLLER CHAINS

Save maintenance costs in your plant

Plant men who work with Morse Roller Chains know from first hand experience how efficiently they transmit power. They know that because Morse Roller Chains hold 70% more oil, they need be oiled far less frequently than ordinary roller chains. They see Morse Chains transmitting power-loads smoothly and quietly year after year—with practically no time out for maintenance or repairs.

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SILENT CHAINS ROLLER CHAINS FLEXIBLE COUPLINGS KELPO CLUTCHES

MORSE *positive* DRIVES

MORSE CHAIN COMPANY ITHACA N.Y. DIVISION BORG-WARNER CORP.

Queens, N. Y., 1100 tons; 350 tons for additions to school No. 142, and 750 tons for school No. 160, both to Bethlehem Fabricators, Inc., Bethlehem, Pa.

Queens, 1400 tons, superstructure, south unit Flushing River bridge, to Bethlehem Steel Co.

Garden City, N. Y., 120 tons, Cathedral House, to Post & McCord.

Niagara Falls, N. Y., 110 tons, Gilman Fanfold Co. factory extension, to Austin Co., Cleveland.

Clark Township, N. J., 555 tons, Inland Mfg. Division, General Motors Corp., to R. C. Mahon, Detroit.

Chester, Pa., 120 tons, South Chester Tube Co. building, to Belmont Iron Works, Philadelphia.

Philadelphia, 105 tons, Franklin Fire Insurance Co. building, to Bethlehem Fabricators, Inc., Bethlehem, Pa.

Trenton, N. J., 350 tons, power house for Ternstedt Mfg. Division, General Motors, to Bethlehem Steel Co.

Erie, Pa., 285 tons, court house, to Erie Steel Construction Co., Erie, Pa.

THE SOUTH

Roanoke, Va., 1060 tons, Hotel Roanoke addition, to Virginia Bridge Co., Roanoke.

Alcoa, Tenn., 460 tons, Aluminum Co. of America, extension to building No. 32, to Virginia Bridge Co.

Mobile, Ala., 855 tons, Aluminum Co. of America, extensions to buildings Nos. 20 and 35, to Ingalls Iron Works Co., Birmingham.

Alabama City, Ala., 610 tons, Republic Steel Corp. building extensions, to Southern Steel Works Co., Birmingham.

Jackson, Miss., 450 tons, Heidelburg Hotel addition, to Decatur Iron & Steel Co., Decatur, Ala.

CENTRAL STATES

Cleveland, 170 tons, bridge for Southerly sewage disposal plant, to Wheeling Structural Steel Co., Wheeling, W. Va.

Cleveland, 150 tons, sub-station for Cleveland Electric Illuminating Co., to Paterson-Leitch Co., Cleveland.

Cleveland, 425 tons, extensions for Brewing Corp. of America, to Bethlehem Steel Co.

Lansing, Mich., 430 tons, building, Motor Wheel Corp., to Jarvis Engineering Works, Lansing.

Marquette, Mich., 135 tons, bridge, to American Bridge Co.

Rockford, Ill., 225 tons, Kress store, to Mississinpi Valley Structural Steel Co., St. Louis.

Ames, Iowa, 670 tons, Grand Avenue crossing, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

Dallas County, Iowa, 115 tons, I-beam spans, to Des Moines Steel Co., Des Moines, Iowa.

Kaukauna, Wis., 100 tons, gates and miscellaneous material, Government lock, to Lippmann Engineering Works, Milwaukee.

La Crosse, Wis., 2100 tons, Allis-Chalmers plant buildings, to Worden-Allen Co., Milwaukee.

St. Louis, 680 tons, Keasby & Mattison building, to Mississippi Valley Structural Steel Co.

Harrison County, Mo., 120 tons, bridge, to St. Joseph Structural Steel Co., St. Joseph, Mo.

Keystone, Neb., 360 tons, Central Nebraska Power and Irrigation District, gates and machinery, to Omaha Steel Works, Omaha, Neb.

Columbus, Neb., 220 tons, Loup River Public Power District, four substations, to International Stacey Corp., Columbus, Ohio.

WESTERN STATES

Polson, Mont., 110 tons, spillway bridge, to Kansas City Structural Steel Co., Kansas City, Kan.

State of Montana, 455 tons, bridges; Blain County, 145 tons, to Minneapolis-Moline Power Implement Co., Minneapolis; Sweet Grass County, 115 tons and Madison County, 195 tons, both to Midwest Steel & Iron Works Co., Denver.

Fremont County, Colo., 190 tons, bridge, to Midwest Steel & Iron Works Co.

Los Angeles, 1100 tons, furnace material, Richfield Oil Co., to Bethlehem Steel Co.

Los Angeles, 950 tons, two factory buildings for Johns-Manville Corp., to Consolidated Steel Corp., Los Angeles.

Santa Monica, Cal., 105 tons, post office, to Bethlehem Steel Co.

Bellingham, Wash., 220 tons, addition to factory building, Puget Sound Pulp & Timber Co., to Isaacson Iron Works, Seattle.

Bonneville, Ore., 1000 tons, fish wharves and trash racks for Bonneville Dam; schedules 1, 4 and 9 to Lakeside Bridge & Steel Co., Milwaukee; schedules 3, 5 and 8 to Pacific Car & Foundry Co., Seattle; schedules 2 and 6 to Berkeley Steel Construction Co.; schedule 7 to General Iron & Steel Co.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Deer Isle-Sedgwick, Me., 1300 tons, State bridge.

Wilmington, Del., 350 tons, store and office building, DiSabatino Holding Co.

Wilmington, 350 tons, polytechnic high school; bids in.

Upper Darby, Pa., 300 tons, school; bids in Sept. 15.

CENTRAL STATES

Willoughby, Ohio, 260 tons, extension for Ohio Rubber Co.

Michigan City, Ind., 220 tons, welding building, Pullman-Standard Car Mfg. Co.

South Chicago, 650 tons, extension to blooming mill, Republic Steel Corp.

WESTERN STATES

Los Angeles, 600 tons, second crossing, Los Angeles River, for Southern Pacific Co.

Mendocino County, Cal., 109 tons, State bridge over Garcia River; bids Sept. 29.

Olympia, Wash., 410 tons, four State bridges; bids Sept. 21.

FABRICATED PLATES

AWARDS

Bridgeville, Pa., 145 tons, American Cyanamid & Chemical Corp., to Buffalo Tank Co., Buffalo.

Baton Rouge, La., 460 tons, caissons, Mississippi River bridge, to St. Louis Shipbuilding & Steel Co., St. Louis.

Denver, 510 tons, four miles of conduit, to Thomson Mfg. Co.

SHEET PILING

AWARDS

Pittsburgh, 140 tons, U. S. Engineers Office, to Jones & Laughlin Steel Corp., Pittsburgh.

Baltimore, 289 tons, Consolidated Gas, Electric Light & Power Co., to Bethlehem Steel Co.

Waukegan, Ill., 160 tons, harbor and dock improvement, to Carnegie-Illinois Steel Corp., Pittsburgh.

NEW PROJECTS

New York, 707 tons, Bronx-Whitestone bridge; bids in.

Machine Tool Orders Gained in August

MACHINE tool orders during August gained nearly 5 per cent over July, according to the monthly report of the National Machine Tool Builders Association. The index figure for the month was 179.8 as compared to 171.1 in July. Domestic orders showed quite an uptrend reaching an index figure of 129.5 as compared with 115.4 in July. Foreign business, however, declined in August to 50.3 from 55.7 in July. The three months' average was 180.9, or down about 10 points from 190.5 in July.

Keystone Steel & Wire Co. reports net earnings of $1,160,857, after all deductions, for the year ended June 30. This is equal to $1.53 per share on 757,632 capital shares. Net income for the year ended June 30, 1936, was $1,501,493, or $1.90 per share after provisions for the dividends on preferred stock retired that year.

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This Towmotor lift truck brings empty hopper to pipes carrying waste material from fabricating machines. When hopper is filled, operator elevates or lowers same, drives out, trips bottom dump and returns for new load. One lift truck tends 25 hoppers in this plant. Suitable for handling waste materials and bulk raw materials with greater speed and economy. Dual tired driving wheels under load for perfect stability. Rear wheel steering for short pivot turns. Massive brakes. Hydraulic lift and tilt. Maximum gas consumption ½ gallon per hour. Special types built to handle most any commodity. Lower cost per year and per ton moved. Write for new lift truck bulletin with specifications and prices.

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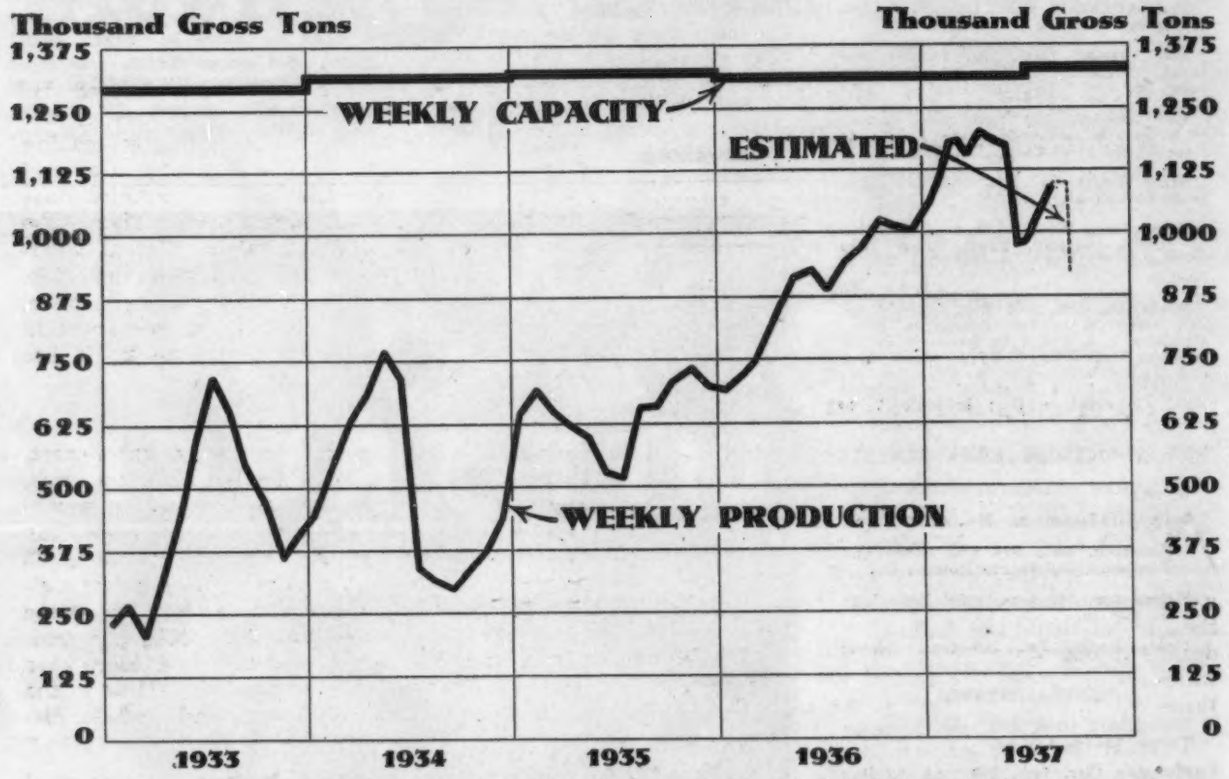
GAS HAULAGE EQUIPMENT SINCE 1919

PRODUCTION

Average Weekly Production of Open-Hearth and Bessemer Steel Ingots by Months, 1933-1937, and Estimated Production by Weeks in 1937



Figures for the Current Week Are Not Indicated on the Chart Until the Following Week

STEEL INGOT PRODUCTION BY DISTRICTS: Per Cent of Capacity

	Current Week	Last Week*
Pittsburgh	82.0	65.0
Chicago	80.5	72.0
Valleys	74.0	63.0
Philadelphia	67.0	56.5
Cleveland	67.0	59.0
Buffalo	79.5	72.0
Wheeling	97.0	82.0
Southern	76.5	59.5
Ohio River	92.5	76.0
Western	95.0	79.0
St. Louis	74.5	58.0
Detroit	..	79.0
Eastern	70.0	81.5
Aggregate	80.0	70.0

* Allowance made for holiday.

Weekly Booking of Construction Steel

	Week Ended				Year to Date	
	Sept. 14, 1937	Sept. 8, 1937	Aug. 17, 1937	Sept. 15, 1936	1937	1936
Fabricated structural steel awards	19,120	24,400	12,450	20,540	826,885	802,030
Fabricated plate awards	1,215	925	2,270	1,415	73,485	178,060
Steel sheet piling awards	590	105	525	0	41,850	40,350
Reinforcing bar awards	6,970	3,200	11,050	2,770	204,650	259,955
Total Lettings of Construction Steel	27,895	28,630	26,295	24,725	1,146,875	1,280,395

. . . SUMMARY OF THE WEEK. . . .

▼ ▼ ▼

. . . Steel orders rise slowly as backlogs and output shrink.

o o o

. . . Tonnage this month 15 to 30% over corresponding August period.

o o o

. . . Ingot output at about 80%; steel scrap declines further.

ALTHOUGH new steel business has shown a moderate improvement thus far in September over the corresponding period of August, the gain has not yet been sufficient to prevent the further shrinkage of mill backlogs and a slow decline in operations to an estimated 80 per cent, which, while above the Labor Day week rate, is three points below the pre-holiday output.

Tonnage received by the mills this month is variously figured at from 15 to 30 per cent over the first half of last month. A leading producer, for example, has had a gain of about 16 per cent, while another's total has risen 23 per cent. However, steel business in early August was approximately at the low point of the summer.

Such improvement as has occurred has come in the face of war scares and a drastic stock market slump, which undoubtedly have added to the hesitancy of buyers. The steel industry has been mystified by the sharp decline in prices of its securities; after allowing for some revision downward in operations and business volume from the recent high rates, it sees no reason for a pessimistic view of steel trade conditions over the remainder of the year.

What actually is happening now is a gradual adjustment of operations to current demand. Consumption remains high in a number of important industries, including can making and farm equipment manufacturing, with automobile production in a rising trend that will call for more steel soon; but at the same time a good many consumers and jobbers have fairly large stocks which they are liquidating before placing replenishment orders. With a probable rising trend in new business from now on and some further drop in operations, a balance between supply and demand is expected to be reached within the next few weeks.

This current readjustment to a delayed fall demand finds reflection again this week in the scrap markets, where prices of steel-making grades have declined 50c. to $1 a ton in several of the principal centers. Steel companies have almost entirely stopped buying scrap. There have been declines of $1 at Cleveland, 50c. at Pittsburgh, Youngstown and Philadelphia, and 25c. at Chicago. THE IRON AGE scrap composite price, at $19.33, is still $2.25 above the low point in June and $2.59 below the spring peak. It has dropped $1.25 since Aug. 24.

PRODUCTION of steel presents a mixed picture. In an effort to make up for lost time last week, some mills in the Pittsburgh district are temporarily running at higher than their pre-holiday rate, and the district as a whole is averaging 82 per cent of capacity, the same as week before last. At Chicago, however, the decline from two weeks ago is five and a half points to 80½ per cent. Compared with the week ended Sept. 4, there have also been downward revisions of operations in the Youngstown, Cleveland-Lorain, and Buffalo districts.

As a measure of general business activity, steel production even at its present rate of around 80 per cent presents a fairly satisfactory situation, the current activity being only moderately below the average of 83.9 per cent for the first eight months of this year and, excepting 1937, it is well above any month since the spring of 1930.

IN the offing are larger orders from the automobile industry, probably before the end of the month, and the beginning of what is expected to be a large agricultural demand, as farmers turn from work in the fields to rehabilitation of their properties. A sign of confidence in the midst of much uncertainty is the appearance in the Chicago district of inquiries from pressed and formed metal manufacturers for steel for first-quarter production of automobile parts, refrigerators and electrical equipment.

Although steel backlogs have been declining, pig iron orders for the remainder of the year are substantial. At Chicago shipments are running well ahead of those last month. Machine tool orders rose about 5 per cent in August, and the outlook for fall is encouraging. An order for 400 presses was placed by General Motors Corp. for its new hardware plant at Trenton, N. J.

Connellsville foundry coke has declined 10c. a ton to $4.25.

. . . PITTSBURGH . . .

. . . Some district mills operating better than in pre-holiday week.

o o o

. . . New orders have gained from 17 to 30% over corresponding August period.

o o o

. . . No. 1 heavy melting steel off 50c.; Connellsville foundry coke declines.

PITTSBURGH, Sept. 14. — Steel ingot output in the Pittsburgh district has rebounded 17 points to 82 per cent of capacity, the level that existed before the holiday week. Wheeling district operations have regained 15 points to 97 per cent of capacity. In an attempt to make up for lost time last week, some steel plants in the Pittsburgh district are operating at a higher rate of production than was the case two weeks ago. A few mills, however, are operating at a lower rate than two weeks ago because of diminished backlogs.

It is apparent that ingot output will be more closely adjusted to incoming business during the next several weeks. The improvement noted in finished steel business several weeks ago continues and has taken on more life in the past few days. Total sales so far this month are running from 17 to 30 per cent ahead of the corresponding August period.

Semi-finished steel demand is exceptionally good and, while oil-country goods bookings are not as heavy as a month ago, a fair amount of such business is coming in. An increase in automobile parts makers' activity is reflected in improved wire and sheet demand, but strip specifications from automobile manufacturers in large amounts are still slow in materializing. In the heavy plate and shape category, plate demand seems to be holding up much better than structural.

Raw material markets are exceptionally dull and unimpressive. No. 1 heavy melting steel is quoted at $20.50 to $21 a ton, down 50c.

Pig Iron

With some consuming lines showing a seasonal pick-up, new business is slightly better than during the corresponding period last month. A considerable number of customers have placed contracts for their fourth quarter requirements, while others are content to follow a policy of hand-to-mouth buying. Meanwhile, shipments are being maintained at recent levels.

Semi-Finished Steel

Specifications so far this month are running ahead of the corresponding August period and there is every indication that the recent upward trend in bookings will continue. Sheet bars are moving briskly and there is a healthy demand for skelp.

Bolts, Nuts and Rivets

Specifications from automotive makers have improved slightly. Miscellaneous demand is only fair and bookings from structural shops and railroad car manufacturers show little change from recent activity.

Bars

Hot rolled bar business so far this month shows little change from the corresponding August period, but there has been enough evidence recently to expect material improvement in new business, especially when heavier motor car production gets under way. Deliveries are easier and there is a disposition on the part of some consumers to order material only as needed. This condition is not considered unusual as there is no incentive to make forward commitments.

Cold Finished Bars

Bookings so far this month are considerably ahead of the corresponding period last month and the improvement is not necessarily confined to automotive purchases. There are indications of a resumption of buying by miscellaneous sources for fall production programs. The improvement in total bookings noted a few weeks ago has carried through in the past week. Moderate-sized tonnages have been placed by automotive, textile machinery and sewing machine manufacturers. Jobber inquiries are also becoming more noticeable.

Reinforcing Bars

Reinforcing bar awards in the past week were fairly numerous; the outstanding one involved 4300 tons for sedimentation tanks for a Detroit sewage disposal system. The bars on this project will be furnished by Carroll-McCreary, Inc., Brooklyn, N. Y. Inquiries in the past week include 2000 tons for a storm sewer project, contracts 2 and 3, Queens, N. Y.

Plates and Shapes

Structural plate and shape specifications have improved slightly in the past week due mainly to better plate bookings. Bethlehem Steel Co. will furnish 1400 tons of material for the superstructure on the South unit, Flushing bridge, Queens, N. Y., and 1100 tons of plates and shapes to be used as furnace material for the Richfield Oil Co., Los Angeles. Structural inquiries in the past week were unimpressive.

Steel Sheet Piling

Steel sheet piling awards continue light and involve a few projects of less than 200 tons. Bids have been taken for 700 tons of piling for the Bronx-Whitestone bridge in New York.

Sheets

Moderate improvement in sheet specifications is still apparent and total business so far this month is running ahead of the corresponding August period. Practically all of this improvement has been due to automotive buying. Miscellaneous demand is no better than has been the case over the past several weeks, which may be due, in some measure, to excess stocks at customers' plants. Refrigerator manufacturers are expected to be in the market soon for fall production material. Galvanized sheets are moving briskly in anticipation of

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous
Advances Over Past Week in Heavy Type, Declines in Italics

Rails and Semi-finished Steel

Per Gross Ton:	Sept. 14, 1937	Sept. 8, 1937	Aug. 17, 1937	Sept. 15, 1936
Rails, heavy, at mill	$42.50	$42.50	$42.50	$36.37½
Light rails, Pittsburgh	43.00	43.00	43.00	35.00
Rerolling billets, Pittsburgh	37.00	37.00	37.00	30.00
Sheet bars, Pittsburgh	37.00	37.00	37.00	30.00
Slabs, Pittsburgh	37.00	37.00	37.00	30.00
Forging billets, Pittsburgh	43.00	43.00	43.00	37.00
Wire rods, Nos. 4 and 5, P'gh	47.00	47.00	47.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	2.10	2.10	2.10	1.80

Finished Steel

Per Lb.:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	2.45	2.45	2.45	1.95
Bars, Chicago	2.50	2.50	2.50	2.00
Bars, Cleveland	2.50	2.50	2.50	2.00
Bars, New York	2.78	2.78	2.78	2.30
Plates, Pittsburgh	2.25	2.25	2.25	1.90
Plates, Chicago	2.30	2.30	2.30	1.95
Plates, New York	2.53	2.53	2.53	2.19
Structural shapes, Pittsburgh	2.25	2.25	2.25	1.90
Structural shapes, Chicago	2.30	2.30	2.30	1.95
Structural shapes, New York	2.5025	2.5025	2.5025	2.16¼
Cold-finished bars, Pittsburgh	2.90	2.90	2.90	2.25
Hot-rolled strips, Pittsburgh	2.40	2.40	2.40	1.95
Cold-rolled strips, Pittsburgh	3.20	3.20	3.20	2.60
Hot-rolled annealed sheets, No. 24, Pittsburgh	3.15	3.15	3.15	2.50
Hot-rolled annealed sheets, No. 24, Gary	3.25	3.25	3.25	2.60
Sheets, galv., No. 24, P'gh	3.80	3.80	3.80	3.20
Sheets, galv., No. 24, Gary	3.90	3.90	3.90	3.30
Hot-rolled sheets, No. 10, Pittsburgh	2.40	2.40	2.40	1.95
Hot-rolled sheets, No. 10, Gary	2.50	2.50	2.50	2.05
Cold-rolled sheets, No. 20, Pittsburgh	3.55	3.55	3.55	3.05
Cold-rolled sheets, No. 20, Gary	3.65	3.65	3.65	3.15
Wire nails, Pittsburgh	2.75	2.75	2.75	1.90
Wire nails, Chicago dist. mill	2.80	2.80	2.80	1.95
Plain wire, Pittsburgh	2.90	2.90	2.90	2.40
Plain wire, Chicago dist. mill	2.95	2.95	2.95	2.45
Barbed wire, galv., P'gh	3.40	3.40	3.40	2.40
Barbed wire, galv., Chicago dist. mill	3.45	3.45	3.45	2.45
Tin plate, 100-lb. box, P'gh	$5.35	$5.35	$5.35	$5.25

On export business there are frequent variations from the above prices. Also in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

Pig Iron

Per Gross Ton:	Sept. 14, 1937	Sept. 8, 1937	Aug. 17, 1937	Sept. 15, 1936
No. 2 fdy., Philadelphia	$25.76	$25.76	$25.76	$21.3132
No. 2, Valley furnace	24.00	24.00	24.00	19.50
No. 2, Southern Cin'ti	23.69	23.69	23.69	19.44
No. 2, Birmingham†	20.38	20.38	20.38	15.88
No. 2, foundry, Chicago*	24.00	24.00	24.00	19.50
Basic, del'd eastern Pa.	25.26	25.26	25.26	20.8132
Basic, Valley furnace	23.50	23.50	23.50	19.00
Malleable, Chicago*	24.00	24.00	24.00	19.50
Malleable, Valley	24.00	24.00	24.00	19.50
L. S. charcoal, Chicago	30.04	30.04	30.04	25.2528
Ferromanganese, seab'd, carlots	102.50	102.50	102.50	75.00

†This quotation is subject to a deduction of 38c. a ton for phosphorus content of 0.70 per cent or higher.
*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$20.75	$21.25	$22.00	$17.75
Heavy melting steel, Phila.	19.25	19.75	19.75	15.50
Heavy melting steel, Ch'go	18.00	18.25	19.75	16.25
Carwheels, Chicago	19.25	19.25	19.75	16.00
Carwheels, Philadelphia	20.75	20.75	20.75	16.75
No. 1 cast, Pittsburgh	19.75	20.25	20.25	16.25
No. 1 cast, Philadelphia	20.25	20.75	21.25	16.75
No. 1 cast, Ch'go (net ton)	14.75	15.25	16.75	13.50
No. 1 RR. wrot., Phila.	20.75	20.75	19.75	15.75
No. 1 RR. wrot., Ch'go (net)	15.75	15.75	19.75	14.25

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$4.25	$4.35	$4.35	$3.65
Foundry coke, prompt	5.00	5.00	5.00	4.00

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, Conn.	14.00	14.00	14.00	9.75
Lake copper, New York	14.12½	14.12½	14.12½	9.87½
Tin (straits), New York	59.75	58.75	59.75	45.00
Zinc, East St. Louis	7.25	7.25	7.25	4.85
Zinc, New York	7.60	7.60	7.60	5.22½
Lead, St. Louis	6.35	6.35	6.35	4.45
Lead, New York	6.50	6.50	6.50	4.60
Antimony (Asiatic), N. Y.	18.25	17.50	15.25	12.50

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Sept. 14, 1937	2.605c. a Lb.	$23.25 a Gross Ton	$19.33 a Gross Ton
One week ago	2.605c.	23.25	19.75
One month ago	2.605c.	23.25	20.50
One year ago	2.159c.	18.73	16.50

Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strip. These products represent 85 per cent of the United States output.

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1937	2.605c., Mar. 9	2.330c., Mar. 2	$23.25, Mar. 9	$20.25, Feb. 16	$21.92, Mar. 30	$17.08, June 15
1936	2.330c., Dec. 28	2.084c., Mar. 10	19.73, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.130c., Oct. 1	2.124c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, April 23
1934	2.199c., Apr. 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., Apr. 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., Apr. 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

the new selling practices which take effect Oct. 1. Sheet backlogs have been further reduced and deliveries are easier.

Wire Products

Total wire sales show little change from recent activity. Wire rods are in good demand owing to better production rates at plants supplying automobile parts. Buyers of merchant wire items are digesting the recently announced selling practices, and it is not expected that heavy jobber buying will materialize before the next few weeks or so. Meanwhile, jobbers' stocks are comparatively low and producers look for a fair amount of business from this source.

Tin Plate

Producers are still under considerable pressure for delivery of material which must be shipped before Oct. 1. It is expected that production will be maintained above 100 per cent for the next two weeks at least. Although a falling-off in operations is expected by the end of this month a sharp decline is not looked for.

Strip

Incoming business has shown little change from tonnages placed during the past several weeks. Miscellaneous demand is fair but producers are looking for automotive releases which are expected some time before the end of this month. Meanwhile, backlogs are fairly well cleaned up and prompt delivery is obtainable.

Tubular Goods

Oil-country goods specifications have declined slightly in the past week but incoming business is still of fair-sized proportions. Backlogs have been reduced on this item and are now running from three to six weeks, depending on the size. Producers have not yet been able to build up their own stocks. Bookings of standard pipe are comparatively light and boiler tube activity continues unchanged.

Coal and Coke

Beehive furnace coke activity continues dull, with practically all coke plants on reduced working time. Spot furnace coke was sold recently at $4.25 a ton, while some furnace contracts have been placed for fourth quarter delivery at $4.50 a ton. On the basis of these transactions, Connellsville foundry coke prompt is quoted at $4.25 a ton to $4.50 a ton, down 10c. a ton from last week's quotations. Within the past month there has been a net increase in the number of beehive ovens in operation in the Connellsville district, some of which are for domestic coke production.

...Open-hearth operations reduced; new business slow.

BUFFALO, Sept. 14.—New steel business having shown some recession, mills are operating principally on backlogs which are not being extensively replenished. New automobile business is not coming out in expected volume and open-hearth operations show an important cut.

Bethlehem's Lackawanna plant is now operating 26 furnaces; Republic is down to five and Wickwire-Spencer remains at two.

No sizable lettings of fabricated structural or reinforcing bars have been made locally during the past week.

Purchase of the American Lithographic Division plant in Buffalo by the Morrison Steel Products Co., Inc., is announced. The Morrison company manufactures panels, cowls and other steel fixtures for automobile trucks. The plant building is modern with approximately 110,000 sq. ft. of one-floor design. The property originally cost $500,000.

War in Far East Has Varied Effects Here

CONTINUED hostilities in the Far East have had varied effects on domestic metal markets during the past week. The report that the Chinese Central Government had declared an embargo on shipments of wolframite and antimony ore caused current quotations on these metals to advance. The present price of Asiatic antimony is 17.50c. per lb. for prompt shipment, an advance of a half cent over the price of a week ago. However, due to the scarcity of supplies, very little business is being transacted. The possibilities of a shortage in antimony supplies is not considered serious as the domestic producer of American antimony can probably take care of most of the trade's requirements. Quotations on the American grade moved up to 15.75c. during the week.

The lack of Chinese wolframite has caused a virtual cessation of tungsten ore dealings. Some small lots are said to be in the hands of London speculators, but few sales have been recorded at the higher levels mentioned in connection with these supplies. One lot of ore was offered in New York last week at $30 per net ton unit, but whether or not takers were found at this price is not known.

Ferro-tungsten producers are firmly declining to quote prices, terming them "strictly nominal," and are accepting only the most urgent business. As most users of ferrotungsten are covered well into 1938 on their requirements, the true effects of a shortage of tungsten will not be felt for some time.

The rising tungsten prices have been further reflected in the recently announced increase in the base price of high speed tool steel. The new base, which will go into effect Oct. 1, is 80c. per lb., an advance of 13c. over the previous level. The regular 18-4-1 type steel is the most popular grade affected by this increase.

High Ductility Alloy Steel Welding Rod

A NEW gas welding rod designated as the Airco No. 1 high ductility alloy steel rod, for both single and multi-layer welds, has been placed on the market by the Air Reduction Sales Co., Lincoln Building, New York. An outstanding feature is its ability to withstand considerable heating without burning. Free bend ductilities of single-layer welds range from 20 to 30 per cent, depending on the composition of the steel, and of multi-layer welds they are up to 40 per cent on low and medium-carbon steels. Ultimate tensile strengths are in excess of 60,000 lb. per sq. in. Charpy impact values on keyhole notched specimens at 70 deg. F. range from 15 to 30 ft.-lb., and Rockwell hardness of weld metal from B60 to B85, depending on carbon content of base metal and type of weld.

British Salvaging Scrap From Ocean

LONDON (*Special Correspondence*).—British salvage steamers are now engaged in the salvage of scrap iron from British waters. During the war hundreds of vessels were sunk off the British coast in relatively shallow water and the present demand for scrap iron has made their salvage a commercial proposition.

Plates and equipment are being recovered in this way, but no attempt is being made to recover complete vessels, as was done in the case of the German fleet.

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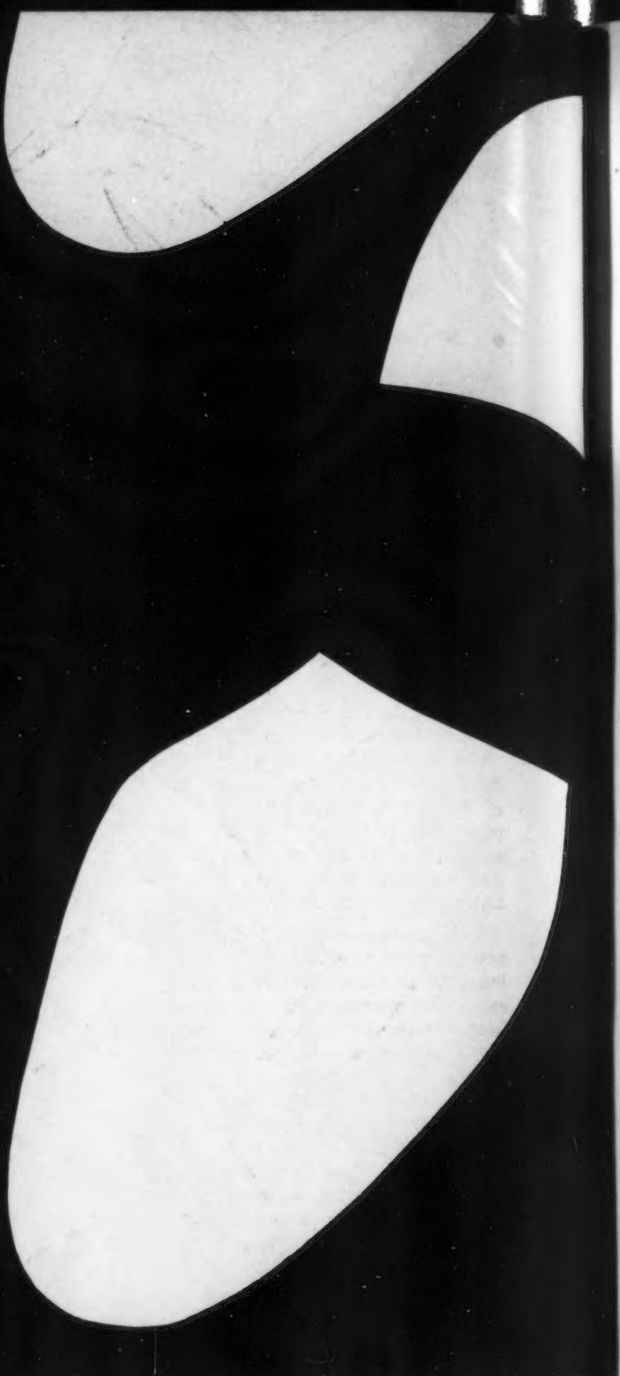

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. . . . CHICAGO . . . .

. . . Operations slightly below pre-holiday rate; backlogs still receding.

o o o

. . . Specifications from automotive industry have not attained expected volume.

o o o

. . . Pig iron producers have large backlogs; farm purchasing of steel looked for soon.

CHICAGO, Sept. 14.—Ingot production this week increased eight and one-half points to 80½ per cent of capacity. In spite of decreases in operating rates at two district mills, this rate, however, represents a decline of five and one-half points from the pre-Labor Day week ended Sept. 4.

The steady drop in backlogs has not yet been checked, although one leading producer reports current sales and specifications 15 per cent better than at this time last month. Tank makers and structural fabricators are actively specifying plates. Specifications from the automobile industry are coming in more slowly than was expected; some of the farm implement makers are at the in-between season when fall tools are being cleared up and spring production has not commenced; no support is being given yet by the railroads, and construction is still poor. It is understood that a Western road will lease 1000 hopper cars from a car building company which has already begun work on the program.

Through it all steel production has remained consistently high. Backlogs, consequently, are well depleted except in tin plate. Good delivery may be had even of sheets, bars and wire, although when the automotive industry begins to operate more fully, and farm purchasing begins, deliveries on these three lines are expected to lengthen.

Operations of the tractor and implement makers appear to be unchanged. Machine tool sellers are anticipating a prosperous fall, as are pig iron producers. some of whom report exceptionally large backlogs.

One mill has received inquiries from pressed and formed metal manufacturers on material for some of next year's automobiles, refrigerators and electrical equipment.

Heavy melting steel scrap is quoted this week at $17.75 to $18.25, down 25c. from last week because of brokers' ability to buy at the lower figure and a lack of consumer interest.

Pig Iron

Shipments over the first half of September have been well above those in the same period of August. Increased activity in foundries supplying castings to the automobile industry is mainly responsible for this better showing, although at the same time a continuation of the melt is necessary in machine tool, railroad, farm equipment and general foundries, if the rate is to continue to advance. Sellers here have well-filled order books, but are still taking spot orders for fourth quarter. Current sales are believed to have slowed slightly because of weakness in securities and a feeling of uncertainty among consumers.

Reinforcing Steel

Although awards are not yet large, the prospects at the moment are the brightest for several weeks. In Detroit, 2400 tons of billet bars and 1900 tons of rail steel bars are to be required for a sewage project on which Rosoff Brothers, New York, are low bidders. Also expected to close this week are the Wesley Memorial Hospital and the Moody Bible Institute building here, the two to take about 1300 tons of bars. It is understood that this work will go to Inland Steel Co. Inland obtained a contract for 200 tons of bars for a warehouse in Chicago last week and Ryerson was given 300 tons for the Allis-Chalmers Milwaukee plant. Prices are fairly firm in the vicinity of Chicago, but price cutting is reported from outlying districts, as much as $14 a ton, in some instances.

Plates and Structural Shapes

Little demand has been in evidence for plates recently, and, with winter nearing, the activities of the tank makers, especially those that specialize in underground tanks, is expected to diminish. Little or nothing can be expected from the railroads for the remainder of the year. The most recent order is 100 box cars to Pullman-Standard Car Mfg. Co. from the Soo Line. Activity at the West Allis and La-Crosse plants of Allis-Chalmers has supplied structural fabricators with their only important jobs of the past week, an extension at West Allis requiring 675 tons going to American Bridge Co., and another extension at La-Crosse, requiring slightly over 2000 tons, going to Worden-Allen Co. Inquiries are not numerous.

Bars

Releases of tonnages from the automobile builders and parts makers are adding to the brightness of the bar picture this week. Activity has been noted particularly among spring and bumper manufacturers. Tractor and farm implement makers continue busy, although specifications for fall tools are about cleaned up, and those for spring models are not yet being received. Delivery still requires from two to four weeks.

Wire and Wire Products

Cooler weather in the Middle West and the approach of the time when farmers are able to leave their fields and plan their purchases for the coming year are already having some effect on wire sales. Conditions within a wide radius of Chicago are described as being from fair to good, and the bulk of the rural buying has not even begun. An increase in sales and specifications from the automobile industry lends an additional cheerful note to the picture, large-scale purchasing being expected within the next week or 10 days. Demand from farm equipment suppliers continues good.

Sheets

In a week or 10 days automobile specifications are expected to increase to their normal volume for this period. Activity in this industry has proceeded more slowly than was expected earlier in the summer, and, as a result, unfilled sheet orders are not especially numerous. Hot rolled sheets may be secured in four to five weeks, while cold rolled may be obtained a week sooner.

. . . *Consumers experiencing a lull in business; reflected in small steel orders.*

ST. LOUIS, Sept. 14.—Business in all lines of finished steel is quiet. Most consumers are well supplied with material, and are said to be experiencing a lull for their products. Structural fabricators are complaining of a lack of orders and report that there is very little pending and not much in prospect. New highway projects are unimportant. I. E. Millstone Construction Co., St. Louis, is low bidder on the general contract for the St. Louis Psycopathic Hospital, requiring 615 tons of reinforcing bars.

Consumers of pig iron bought heavily some time ago, and as their melt shows some falling off, they are taking smaller shipments against contracts. Business with the jobbing foundries has shown a marked decrease, operations in some instances being as low as three days a week. Shipments of stoves up to Sept. 1 were reported to have been the heaviest in many years, but since then orders have been few, and the backlogs about wiped out. Open hearth furnaces in the district are operating at about 67 per cent of capacity. The implement industry is still going strong, with operations at full capacity.

. . . *Sheet demand slow; pig iron orders in fair volume.*

CINCINNATI, Sept. 14.—Fourth quarter ordering of pig iron is at a pace undiminished from last week, although large orders are not plentiful. Melters are covering for short future needs without hesitation, but substantial business is still in the offing. Both Northern and Southern furnaces are benefiting from the current rise in demand. Shipments of iron are good and reflect desire of users to replenish depleted inventories. The melt, except in foundries catering to agricultural equipment and stove manufacturers, is low. Jobbing and automobile melters are particularly slow in production.

Finished sheet demand is still at the August level, which was below the brisk demand that had become a habit. Automotive specifications have turned upward and jobbers are hastening to cover before elimination of allowances. Mills are operating, however, at full capacity against small backlogs. In addition, mill stocks are being replenished.

Steel making in the district is steady at about 89 per cent. Thirty-one open hearths out of 34 are in operation.

. . . *Threat of another dock strike holds back some construction jobs.*

SAN FRANCISCO, Sept. 13.—Threats of another serious dock crisis here with unsettled relationships existing between the AFofL and the CIO is delaying much construction work and thereby keeping the steel market sluggish. In spite of this, however, two sizable structural steel awards were made last week and two more are expected in the near future.

At Bonneville, Ore., 1000 tons of shapes called for in fish wharves and trash racks for Bonneville Dam have been awarded as follows: Schedules 1, 4 and 9 to Lakeside Bridge & Iron Works; schedules 3, 5 and 8 to Pacific Car & Foundry Co.; schedules 2 and 6 to Berkeley Steel Construction Co.; and schedule 7 to General Iron & Steel Co.

Consolidated Steel Corp. took 950 tons of structural steel involved in the construction of two factory buildings for Johns-Manville Corp. at Los Angeles.

No award has yet been announced of the 3000 to 10,000 tons of sheet steel piling to be used in a graving dry dock at Mare Island, Cal. Nor has an award been made of the 3000 to 11,000 tons of structural steel called for in the Palos Verdes feeder of the Colorado River distribution system. Awards on both of these are expected momentarily.

Aggregate structural steel awards were 2864 tons while the total of reinforcing bar lettings was 1133 tons.

. . . *Pig iron buying improving moderately; one furnace blown out.*

BIRMINGHAM, Sept. 14.—Lately there has been a moderate improvement in pig iron shipments, and the total September movement to date is better than for the same period in August. Local pig iron producers expect to have a satisfactory fourth quarter. Forward tonnage is now being booked at a fair rate.

Steel demand from the farm markets is developing gradually and is not yet fully under way. Rains have recently interfered with the marketing of cotton. Mill schedules, in most instances, however, are still at high points.

For the first time in over two months there is a change in the active blast furnace total. During that time operations were on a 100 per cent basis. Last week the Tennessee Coal, Iron & Railroad Co. blew out Fairfield No. 6 for relining. This leaves 17 furnaces active.

In spite of the shutdown of the Ensley rail mill, steel production continues near the year's top point. Last week 19 units were worked and the same number is scheduled this week.

Work has been started on the new open hearth addition at the Gulfsteel works of the Republic Steel Corp. at Gadsden. A new plant office building is nearing completion.

Virginia-Carolina Chemical Corp. has awarded a contract to the Leonard Construction Co., Chicago, for the construction of sulphuric acid plant adjacent to its Birmingham fertilizer plant. The plant is to cost around $200,000. This new plant was prompted by the new developments of the Tennessee Coal, Iron & Railroad Co.

Current scrap buying is weak. Contract shipments are still holding to a good rate.

. . . CLEVELAND . . .

. . . Ingot output recovers part of the loss of holiday week.

o o o

. . . New business improves slightly, but is still less than shipments.

o o o

. . . Large orders from automotive industry delayed; refrigerator makers buy.

CLEVELAND, Sept. 14.—Ingot output in the Cleveland-Lorain district this week advanced eight points to 67 per cent of capacity and in the Youngstown district 11 points to 74 per cent of capacity, regaining fully one-half of the loss sustained during the previous week, when the reduction in operations was partly due to Labor Day interruptions. An additional blast furnace is being put on in Youngstown this week by the Republic Steel Corp.

New demand for finished steel shows a gain over the previous week and over the corresponding period in August, but the improvement is only slight. Shipments are still in excess of incoming business, although there has been some reduction in finishing mill operations. Orders for sheets from motor car manufacturers and for bar products for makers of automobile parts gained a little during the week. However, the placing of large tonnages by the automotive industry is still being delayed. Refrigerator manufacturers supplied some new business in sheets for new models and miscellaneous orders improved slightly.

That the volume of business is below recent expectations seems to be due to the large inventories that many consumers are still carrying as well as to the absence of large specifications from the motor car industry. Other factors in the situation include the slowing down in the building industry and the absence of railroad buying. In addition, the stock market slump is not helping the steel market. Plants of miscellaneous consumers are busy but, as rather prompt deliveries can be secured on nearly all steel products, forward buying has virtually disappeared.

Rail mills need new orders, but it seems doubtful whether roads in this territory will make new purchases in time for 1937 rolling. The Erie Railroad, which purchased about 18,000 tons last year, is expected to place about the same tonnage near the end of this year. Some of the mills have enough backlog tonnage in line pipe to keep them busy until November. Merchant pipe is quiet.

Steel-making scrap has declined 50c. to $1 a ton in Cleveland and Youngstown.

Bars, Plates and Shapes

Orders for hot rolled bars gained a little the past week, some business coming from forge shops for automobile parts, and there was a little improvement in miscellaneous demand. However, the volume of business still is light and mills need orders. Structural shapes and plates are quiet. Four structural contracts aggregating about 1000 tons were awarded during the week, the largest being 425 tons for extensions for the Brewing Corp. of America, Cleveland. New inquiry is light. The Ohio Rubber Co., Willoughby, has taken bids for a factory extension requiring 260 tons.

Pig Iron

While some sales are still being made, the spurt in buying reported last week has subsided. A decline in scrap prices and a slump in the security markets evidently have had an effect on buyers, who are now showing hesitancy about making commitments. Releases are not coming from motor car manufacturers as rapidly as looked for, but September shipments are expected to be at least equal to those during August.

Sheets and Strip

Orders for sheets showed a slight gain in the past week. The pick-up in the demand was most noticeable in the refrigerator industry—one manufacturer who is getting under production on new models ordered a good tonnage and others placed smaller lots. Business continues to come from motor car manufacturers, but their purchases are still rather small. Mills look for round-lot orders from that industry before the end of the month. With shipments still exceeding new business, backlogs continue to grow smaller and nearly all mills now need business, although some still have fair bocklogs of light hot rolled and galvanized sheets. New demand for galvanized sheets is very slow. Strip orders are light, a little business coming from automobile parts manufacturers who have not yet got under production on parts for new models and still have considerable steel in stock. Most mills need tonnage of both hot and cold rolled strip.

Ore

Ore receipts at Lake Erie ports during August were 7,196,384 tons, or 358,848 tons less than in July. Receipts to Sept. 1 were 30,838,113 tons as compared with 17,527,029 tons during the corresponding period last year. Shipments from these ports in August were 4,986,014 tons, or 509,171 tons less than in July. Shipments from Lake Erie ports up to Sept. 1 were 22,450,503 tons, or 8,462,407 tons more than the same period last year. The amount of ore on docks Sept. 1 was 4,481,726 tons, a gain of 331,664 tons over the same date last year.

RAILROAD BUYING

Minneapolis, St. Paul & Sault Ste. Marie has ordered 100 box cars from Pullman-Standard Car Mfg. Co.

Navy Department has ordered two flat cars from Haffner-Thrall Car Co.

U. S. Navy Dry Dock Let at $2,790,875

WASHINGTON, Sept. 14.—The George Pollock Co., Sacramento, Cal., has been awarded a $2,790,875 contract by the Navy Department for the construction of a dry dock at the Mare Island, Cal., Navy Yard.

. . . *Awards of 6970 tons —5670 tons in new projects.*

AWARDS

Stamford, Conn., 200 tons of mesh, State road, to American Steel & Wire Co.

New Canaan, Conn., 175 tons of mesh, State road, to American Steel & Wire Co.

Greenwich, Conn., 160 tons of mesh, State road, to Bethlehem Steel Co.

New York, 225 tons, stockyard building, New York Central Railroad, to Truscon Steel Co., Youngstown, Ohio.

West Point, N. Y., 1300 tons, silver depository, to Ceco Steel Products Co., New York.

Queens, N. Y., 360 tons, Southern Parkway, to Concrete Steel Co., New York.

Elizabeth, N. J., 130 tons, grade crossing elimination, Central Railroad of New Jersey, to Bethlehem Steel Co.

Washington, 138 tons, apartment building, Blair Properties, Inc., to Rosslyn Steel & Cement Co., Rosslyn, Va.

Oldham, Ky., 250 tons, State prison, to Concrete Steel Co., New York.

Franklin County, Ohio, 200 tons, Tuberculosis Hospital, to Goldberg Iron & Steel Co., Columbus, Ohio.

Lansing, Mich., 350 tons, municipal power and steam heating plant, to Truscon Steel Co.

Detroit, 2400 tons billet bars and 1900 tons rail steel bars, municipal sewage disposal plant, to Carroll-McCreary Co., Brooklyn.

Chicago, 200 tons, First National Bank warehouse, to Inland Steel Co.

West Allis, Wis., 300 tons, extension, Allis-Chalmers Mfg. Co., to Joseph T. Ryerson & Son, Inc.

Emeryville, Cal., 175 tons, Shell Oil Co. development, to Soule Steel Co.

Cantu, Cal., 144 tons, All-American Canal project, to Colorado Fuel & Iron Co.

Knob, Cal., 152 tons, All-American Canal project, to Bethlehem Steel Co.

Phoenix, Ariz., 107 tons, Salt River project, to Colorado Fuel & Iron Co.

NEW REINFORCING BAR PROJECTS

State of Connecticut, 300 tons, four bridges.

Trumbull, Conn., 250 tons of mesh, State road.

Queens, N. Y., 2000 tons, storm sewers and appurtenances, contracts 2 and 3.

Pittsburgh, 120 tons, warehouse, Kirby Transfer Co.

Norristown, Pa., 300 tons, Norristown State hospital.

Laurelton, Pa., 150 tons, cottages, Laurelton State Village.

Laurelton, 185 tons, hospital; bids in Sept. 14.

Wilmington, Del., 100 tons, Polytechnic high school.

Richmond, Va., 250 tons, city warehouse.

Lansing, Mich., 225 tons, Ottawa generating plant.

LaCrosse, Wis., 175 tons, building, Allis-Chalmers Co.

St. Paul, 450 tons, Minnesota Mining & Mfg. Co.

St. Louis, 615 tons, Psychopathic Hospital; I. E. Millstone Construction Co., St. Louis, low bidder on general contract.

Redmund and Stonecut, Cal., 201 tons, State overpass and underpass; bids Sept. 29.

Potholes, Cal., 245 tons, Gila reclamation project; bids opened.

Rutledge, Tex., 110 tons, Colorado River project; bids opened.

Standard Oil Co. of Ohio, Midland Bank Building, Cleveland, has let contract to Kelly-Dempsey & Co., Tulsa, Okla., for new 5 and 6-in. welded steel pipe line from main refinery at Cleveland to Akron and Canton, Ohio, about 67 miles, for gasoline transmission. New 6-in. welded steel pipe line also has been authorized from refinery at Toledo, Ohio, to Fostoria, Ohio, 38 miles, for gasoline transmission, construction to be carried out by company forces. Award for electric welding on both lines has been made to H. C. Price Co., Bartlesville, Okla. Cost close to $750,000, including booster pumping stations along routes.

Pine Oil Co., Muskogee, Okla., has let construction contract to B. & M. Construction Co., Petroleum Building, Oklahoma City, for new 6-in. welded steel pipe line from Clay, Ill., to Monticello, Ind., about 60 miles, for oil transmisison. Pumping stations for booster service will be installed along route. Cost over $400,000.

Cities Service Gas Co., Bartlesville, Okla., plans 10-in. welded steel pipe line from Edmond to Oklahoma City, Okla., about 8½ miles, for natural gas transmission. Cost close to $75,000.

Valley Pipe Line Co., McAllen, Tex., has authorized new 5½-in. welded steel pipe line from Samfordyce, Tex., oil field to Port Isabel, Tex., about 16 miles, for crude oil transmission to terminal plant of Coastal Refineries, Inc. A similar line also will be built from Samfordyce field to El Tanque district, Starr County, Tex., where new bulk terminal plant and pumping station will be erected, with initial facilities for 5000-bbl. storage capacity, to be increased later to over twice that amount. Lines will have a rated capacity of 7500 bbl. per day, with booster pumping stations along route. Cost over $100,000. H. H. Hensley is general manager.

Ak-Sar-Ben Natural Gas Co., Holbrook, Neb., plans welded steel pipe line from Holbrook to Oxford, Neb., about 18 miles, for natural gas distribution at latter place.

Standard Oil Co. of Ohio, has awarded to Republic Steel Corp. 5000 tons of 4 to 6⅝-in. steel pipe for 110 miles of gas lines between Cleveland and Akron, Toledo and Fostoria, Latonia, Ky., and Cincinnati.

Pacific Gas & Electric Co., 250 Market Street, San Francisco, plans extensions and replacements in steel pipe gas distribution system at San Jose, Cal. Cost close to $40,000.

Trenton, Utah, has received appropriation from PWA for construction of a reservoir and six and a half miles of 10-in. steel pipe.

Silver Lake, Wash., has received fund from PWA for 62,500 lin. ft. of 2 to 10-in. steel pipe.

Preston, Idaho, has received appropriation from PWA for construction of a 500,000 gal. reservoir and 49,000 lin. ft. of steel pipe.

. . . *Industrial plants getting into better production.*

TORONTO, Sept. 14.—Industrial plants are swinging into higher scale operations. Demand for reinforcing bars and structural steel is steady, with mills and warehouse operators pushed for delivery of reinforcing bars; structural steel fabricators are behind in deliveries and it is stated that orders are piling up. Sheet and plate demand is heavy and there is persistent call for builders' hardware and supplies. The automotive industry is taking larger quantities of raw materials, and there is active buying by electric stove and refrigerator concerns. The mining industry continues slow insofar as equipment purchases are concerned, but it is expected there will be a more active demand from this source later in the year. Iron and steel prices are holding firm.

Local blast furnace representatives state that melters are entering the market regularly for supplies and some inquiries have appeared recently for forward delivery. They also state that some of the larger users are taking delivery of iron for future needs and are stocking iron in their yards. Imports are confined to small lots of special grades from the United States. It is understood that Dominion Steel & Coal Corp. will ship iron from its Sydney plant into Ontario in conjunction with its new plans for production in this province. Pig iron production continues at record proportions with six furnaces blowing. Prices are firm and unchanged.

Trading in iron and steel scrap is holding at a good level and some foundry interests continue to complain of difficulty in obtaining machinery cast. Local dealers report that they have a market for all the material they can pick up.

The Association of American Steel Manufacturers, 616 Investment Building, Pittsburgh, has issued a revised edition of its pamphlet on standard permissible variations for dimensions and straightness of hot rolled steel bars, dimensions and weight of bar-size shapes and weight and concrete reinforcing bars. Copies may be obtained on application to the association.

. . . . NEW YORK. . . .

. . . New business in steel fails to show expected revival.

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. . . Stock market slump and war scares have affected business sentiment.

o o o

. . . Price competition develops over 4300 tons of reinforcing bars.

NEW YORK, Sept. 14.—In this area, which is reputedly affected to a greater extent by stock market sentiment and war scares than are other sections of the country, there has been no improvement in steel ordering. One or two offices report a slight gain in volume over the corresponding period of August, but this is not the general experience.

Undoubtedly the stock market break has increased hesitancy among buyers. Some sellers say that orders that were definitely promised were held up with merely the explanation that "we will wait to see what is going to happen."

Considerable competition developed in this market over 2400 tons of billet steel and 1900 tons of rail steel reinforcing bars for a sewage project at Detroit, on which Rosoff Brothers, New York, were low bidders. Although resale prices on reinforcing bars have been subject to concessions of $6 or $8 a ton for some months, an even deeper cut was made on this job, the bars for which will be supplied by a Brooklyn distributor.

Some price weakness was also in evidence on bids on galvanized sheets by New York and Brooklyn jobbers to the Department of Purchase of New York City. Prices submitted by the low bidders were below the recent minimum of 4.50c. a lb. charged by jobbers. Most jobbers have large stocks which are not moving as rapidly as had been expected.

Pig Iron

With vacations completed, foundrymen are formulating plans for the fall's operations and commitments for fourth quarter needs are beginning to seep into dealer's order books in a little better volume than heretofore. However, as many of the larger buyers have yard stocks sufficient to carry them well through the next quarter, it is unlikely that new business will develop to any unusual strength, unless circumstances should arise that would encourage speculative buying on the part of consumers. Foundry melt, particularly in the heater shops, has improved slightly. Strikes called by the CIO in New Jersey foundries have retarded melting operations in that section. The increasing number of releases being received by local dealers on iron that had previously been held up at the buyer's request would seem to indicate that the season's low point had been passed, at least as far as melting operations are concerned. The uncertain outlook abroad and the weakness of the stock market here has undoubtedly had some influence in delaying new business by inspiring a hesitancy on the part of buyers to commit themselves until future trends are more discernible. Export buying is light and inquiries few and far between. Outside of an inquiry for a moderate tonnage for a South American plant, there has been little change in this phase of the market.

Plates and Sheets

New plate and sheet business is at the lowest point reached this year. Following the sharp reaction in the stock market as a result of continued unsettled political conditions abroad and in the Far East, the larger consumers have withheld commitments for other than fill-in tonnages. Smaller consumers, not nearly so susceptible to the psychology of the Street, are holding up their end of the market much better. Calls for sheet and plate for maintenance work goes on, and the chief sustaining outlet for light plate is for domestic tanks at the height of the oil burner sales season. Other users of plates, including locomotive and car builders, shipyards and oil refinery equipment manufacturers are conspicuously absent from the market.

Most of the smaller independent mills report a continued reduction in backlogs, with concurrent steady shortening of delivery promises. Even such items as wide plates, which were quoted at 20 to 22 weeks in the late spring, are now obtainable in five to six weeks.

. . GREAT BRITAIN . .

. . . Consumers anxious to place orders for 1938 delivery; pig iron supplies increasing.

LONDON, Sept. 14 (By Cable).—Iron and steel consumers are anxious to place orders for 1938 delivery, but works are disinclined to quote owing to price uncertainties and the fact of being sold out for six months. More pig iron is available and better shipments under old contracts. Cleveland foundry iron is still scarce but basic and hematite supplies are increasing. The first arrival of Bilbao ore since Franco took control has been unloaded, and further parcels are expected. Semi-finished steel supplies are still scarce.

Armaments are now absorbing large quantities of finished steel, resulting in a holding up of structural work, with consequent unfavorable results in the light castings industry. It is practically impossible to buy heavy steel for delivery before the first quarter.

Tin plate market activity is restricted by makers' disinclination to quote far forward delivery, except in special cases, owing to future costs uncertainties. Supplies of tin plate bars are still inadequate. Some tin plate home consumers are bought up to the first half of next year.

Black and galvanized sheets are

quiet. The next meeting of the International Thin Sheet Cartel will be in Brussels, Sept. 20.

Continental steel market is quiet, but works are well sold and delivery delays are shortening.

Broken Hill Proprietary Co., Australia, is contemplating the erection of a blast furnace with an annual output of 200,000 tons at Whyalla, adjacent to the Ironknob ore deposits.

..CAST IRON PIPE..

Francesville, Ind., plans pipe lines for water system and other waterworks installation. Cost about $40,000. Financing has been arranged through Federal loan and grant. W. Scott Heer Engineering Co., Pekin, Ill., is consulting engineer.

Demorest, Ga., will take bids soon for 27,800 ft. of 2, 3 and 6-in. for water system; also for 80,000-gal. steel standpipe. Cost about $40,000. Robert & Co., Inc., Bona Allen Building, Atlanta, Ga., is consulting engineer.

Waskom, Tex., plans 2, 6 and 8-in. pipe for water system; also 100,000-gal. elevated steel tank on 100-ft. steel tower, pumping station and other waterworks installation. Cost about $75,000. Financing has been arranged through Federal aid.

Lovers Lane Fresh Water Supply District No. 13, Dallas, Texas, plans pipe lines for water system. Bond issue of $35,000 has been voted. Koch-Fowler, Inc., Great National Life Building, is consulting engineer.

Andrews, Tex., plans 27,000 ft. of 2 and 8-in. for water system also 50,000-gal. elevated steel tank and tower, storage reservoir, pumping station and other waterworks installation. A. S. Adams, Handley, Tex., is consulting engineer.

Winnsboro, La., plans about four miles of 4-in. for extensions in water system; also other waterworks installation, including filtration equipment. Swanson-McGraw-Hooper, Inc., Balter Building, New Orleans, is consulting engineer.

Buhler, Kan., will take bids soon for main pipe line for water supply from new source, about four miles distant. Cost close to $35,000. Hefling & Hughes Engineering Co., West Second Street, Hutchinson, Kan., is consulting engineer.

Sylvia, Kan., plans pipe lines for water system and other waterworks installation. Bond issue of $38,600 has been arranged. Hefling & Hughes Engineering Co., West Second Street, Hutchinson, Kans., is consulting engineer.

Metropolitan Utilities District, Omaha, Neb., plans 7300 ft. of 6 and 8-in. for extensions in water system in districts in vicinity of Military and Camden Avenues. T. A. Leisen, Eighteenth and Harney Streets, is general manager and chief engineer.

Twisp, Wash., will ask bids soon on 13,000 ft. of 4, 6 and 8-in. for water system; also pumping machinery and other waterworks installation. Fund of $35,400 has been arranged through Federal aid. Stephen C. Jayne, Wenatchee, Wash., is consulting engineer.

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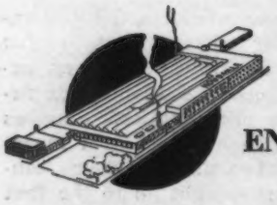

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...BOSTON...

...*Pig iron buying gains slightly; more export inquiry.*

BOSTON, Sept. 14.—Although not brisk, pig iron buying is more active, sales the past week for New England consumption aggregating better than 2000 tons, a small proportion for nearby shipment and the remainder for fourth quarter. Most of the foundries are fairly well occupied and have enough business on books to insure continued operations for some weeks, but a spirit of uncertainty prevails in the industry, which is one reason pig iron is not selling actively. In contrast, European countries are again evincing a lively interest in iron, the largest inquiry being for 10,000 tons for September shipment. A boat is loading approximately 900 tons for China, the last of a 3000-ton purchase.

. . PHILADELPHIA . .

. . . District operations rebound to 67 per cent.

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. . . Miscellaneous buying continues to be sluggish.

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. . . Local autobody makers buying heavily.

PHILADELPHIA, Sept. 14.—Steel sellers are disheartened by the slow way consumers are coming in for additional commitments. It would appear, however, that most mill representatives are excessively depressed by the current status of the market, this depression arising from their difficulty in adjusting themselves to a quiet routine demand after the hectic pressure for deliveries of several months ago. Quite a bit of miscellaneous business is drifting onto sellers books, perhaps not enough to maintain the heavy backlogs of the past but still enough to prevent any sudden break in delivery promises. To buttress this miscellaneous demand, there is every indication that automobile releases will start climbing rapidly within the next three weeks, local shipyards will continue to take steady deliveries on old orders and the railroads, once their labor trouble is clarified, may be a definite factor in the market before the year's end.

After dropping to 56½ per cent last week, owing to Labor Day, the district operating rate is this week back up to 67 per cent. Several smaller mills report a moderate stocking of ingots, but the district as a whole continues to roll all raw steel and ship it out to consumers. The disproportion between production and ordering cannot last indefinitely, however; either most mills will have to get more new business over the remainder of the month or they will have to ease off on operations by the first of October. Probably what will happen will be a combination of the two, some easing in production and some new orders.

In most cases deliveries here are down to normal, although several mills have from six weeks to two months' business still undelivered. But no producer today is turning down business on the question of delivery; for even the busiest will fit a new tonnage into the rolling schedule for immediate delivery if the competitive situation demands such action.

The scrap market here has finally reacted to depressed sentiment in the steel markets, with prices off from 50c. to $1 on the basis of sales or on sentiment alone. Nonetheless, there is still no tendency for prices to sag fast or very much lower.

Pig Iron

So far, September has been an exceptionally dull month for new business. A few 100 or 200-ton orders have drifted in, but sellers for the most part are engaged entirely with the handling of releases on old orders. That iron is steadily going into consumption is indicated by the absence of any hold-ups or cancellations of contract tonnages, and, since many contracts are now near complete liquidation, there is every possibility that replacement orders will start coming in in much better volume by Oct. 1. Like the domestic market, export business is confined entirely to deliveries on old orders. Nonetheless, many furnaces are confidently looking forward to a good volume of firm European inquiry within a month's time.

Shapes and Bars

Building requirements continue to be spotty and in poor volume. Little is in sight, other than the extensive State WPA-financed work, on which initial inquiries are due late in the month. The only local award of the week involved 350 tons for a power house at the new General Motors plant at Trenton, N. J., which was secured by Bethlehem Steel Co. The home office of Keasby & Mattison Co. here has awarded 660 tons for a St. Louis district plant to Mississippi Valley Structural Steel Co. Pending tonnages include 350 tons of shapes and 110 tons of bars for a Wilmington, Del., high school, on which bids went in today; 300 tons of shapes for an Upper Darby, Pa., school, on which bids are due Wednesday; and 185 tons of bars for a Laurelton, Pa., hospital, on which tenders are due tomorrow. With inquiries tapering off sharply for shapes and bars, it is quite likely that fabricators prices may reflect some close figuring in the near future.

Warehouse Business

Turnover so far this month has been comparatively nil, but most warehouses had fully expected such inactivity for at least the first half of September. Toward the latter half, however, better demand is expected, and the average for the month will probably compare fairly favorably with August. Prices are unchanged. Stocks on hand are comfortable, and there will be little necessity for additional buying from mills for at least a month.

Plates and Sheets

New carload orders for sheets are few and far between these days, but many mills must be getting better support for their backlog sheets have shown a tendency to level off during the past week. Although deliveries for most grades of sheets can be speeded up to become almost immediate, at least several of the larger producers have from six weeks to two months' business still on their books. Local autobody plants have been delayed on the production of new models through their inability to secure experienced die makers and machinists to build new dies. Much of this work is rapidly nearing completion, however, and full production is expected within two weeks. Budd has entered some very heavy orders in the past week, and probably has enough tonnage on mill books to last for two months. This year, for the first time, Budd will fabricate Chevrolet fenders, hoods, and odds and ends to take care of Eastern assembly plants. Previously this material had been fabricated in Detroit. The Heintz company has about beaten its strike. About 750 men are now working on three shifts, which is within 100 men of its peak activity. Heintz has also bought steel heavily over the past week, placing particularly heavy tonnages for Overland parts.

Imports

The following iron and steel imports were received here during the past week: 2540 tons of manganese ore from Egypt; 37 tons of steel billets from Sweden; 89 tons of steel bars, three tons of steel bands and 107 tons of structural shapes from Belgium; six tons of structural shapes from France.

IRON AND STEEL SCRAP

. . . Absence of mill purchases and restrictions on shipments has weakened market further.

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. . . Composite price declines to $19.33, down 42c.

SEPT. 14.—Dullness rules in practically all markets, and in the absence of any substantial mill purchases, together with continued holdups on mill shipments in many centers, prices have declined further. At both Pittsburgh and Philadelphia, the primary grades are down 50c., and at Chicago open-hearth grades are off 25c., bringing THE IRON AGE composite figure down 42c. from the preceding week to $19.33. This is the fourth consecutive week in which a decline has been shown, and the composite is now $2.59 below the high of $21.92 of last spring, although it is still $2.25 above the low point of $17.08 in late June. At Cleveland, No. 1 steel is off $1. Export demand is tending to hold prices much firmer at New York, although exporters have lowered their buying prices at Boston.

Pittsburgh

The local scrap market is exceptionally dull, there being practically no transactions on the part of either brokers or consumers. Although the leading interest has lifted restrictions on shipments to a few points, it will probably take a week before this action has any effect on dealer-broker trading. Some mills have been offered No. 1 steel at $20.50 a ton, which has been turned down. Some distress No. 1 steel has been offered for $20 a ton with no takers. No. 1 heavy melting steel quotations are off 50c. a ton from last week's prices to $20.50 to $21 a ton. With two sales of railroad heavy melting having been made at $22 a ton, delivered Pittsburgh, this grade is quotable at $21.50 to $22. Other open-hearth grades of scrap and some blast furnace material are softer.

Chicago

Brokers are now able to pick up carload lots of No. 1 steel at $17.75, although some are offering only $17.50. A railroad turned down a bid of $17.87 for about 20 cars of steel, preferring to wait for higher offerings, while another road is expected to accept around $18 for 15 cars of steel. Mills do not appear interested in further buying this week, but two are expected by brokers to enter the market again soon. The situation here is rather indefinite at present because of uncertainties caused among brokers, dealers and consumers by the stock market slump.

Philadelphia

An uneasy sentiment still pervades this market, although actual price reactions have not been very severe to date. A small sale of No. 1 at $19.50 was consummated last week, and this grade has been marked down accordingly. No. 2 is particularly weak, and is now available in heavy tonnages at between $16.50 and $17. A scattering of other grades also have been marked off, from 50c. to $1, partly on the test of actual orders and partly on sentiment. It is significant that no dealer reports any excess amount of No. 1 available; on the other hand, No. 2 is very plentiful in the absence of any mill demand for this lighter material.

Cleveland

With reduced consumption, the steel plants in the Youngstown district are still holding up scrap shipments and the embargo has been extended to a Cleveland plant. The shut-off of shipments is having a very depressing effect on the market and has resulted in another drop of $1 a ton on steelmaking grades in Cleveland and 50c. a ton in Youngstown. There is no new consumer demand to support prices. Brokers are buying scarcely any scrap as they have no place to ship it. Prices on blast furnace grades are unchanged.

Buffalo

In line with other purchasing centers, this market shows a falling-off, with prices quotable another 50c. lower on most grades. The heaviest consumer of the area is out of the market and, in the absence of any important sales, current quotations are nominal. Dealers with orders are paying $19 and $17 for No. 1 and No. 2 respectively.

Boston

Exporters have cut prices on heavy melting steel $1 a ton or more, and there has been a nominal drop of $1 in the domestic market. The price structure on other kinds of scrap for domestic delivery is uncertain owing to the lack of buying, but definitely lower so far as steel turnings, blast furnace material and bundled skeleton are concerned. Against old orders for turnings as high as $9.30 a ton on cars was offered the past week, but, on the other hand, a car lot is reported to have sold as low as $8. The same range of prices apparently applies to blast furnace material.

New York

Mixed trends are more pronounced in the New York market than previously reported. The domestic demand is low and prices are weak, although the Trenton consumer took a tonnage of selected heavy melting steel at a reputed price of $16.35, f.o.b. New York, slightly above the going price for the regular No. 1 grade, and some material was bought for Coatesville. The Harrisburg consumer of heavy breakable cast has been out of the market for four weeks. Much greater strength is being shown in the export market, but the price level is variable. Some dealers are paying as high as $17.50 for No. 1 steel, while others maintain they are finding ample supplies at $16.50, supplies incidentally that are coming from heretofore untapped sources. There seems no immediate rush to buy material against the last cartel purchase of 250,000 tons, pending final closure of the deal by the principals abroad. The City of New York sold about 3000 tons of scrap trackage at prices of $18.10 for T-rails, $17.10 for girder rails and $16.10 for cast iron, prices being on the ground. The material is for export.

Cincinnati

The scrap market is soft. Mill indifference and war rumors prompted dealers to bid 50c. to $1 lower on all items, with no desire to accumulate too heavy yard stocks. Ordering was in small quantity and less and less frequent as the past week aged.

St. Louis

The market for scrap iron in St. Louis is nominally unchanged, despite weakness in other markets, due to the fact that there is still a short interest among dealers and further there is no distress scrap here. Mills here have placed no restrictions on the shipments of scrap against contracts, as has been done in some other consuming centers. A list of 90 carloads offered by the Missouri-Pacific Railway, which closes this week, is expected to be bought by St. Louis interests.

Detroit

A sharp break in the Detroit market accompanied by an air of apprehension has made itself felt in the last week. All the local consumers are definitely out of the market and no interest has been expressed from outside this area. Offerings are moderately heavy, with higher production in the offing, and the depressing effects apparently will have further result during this week. It appears now that the sharp break was forestalled until after Labor Day because dealers had open orders at good prices which they had to fill.

Iron and Steel Scrap Prices

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.50 to $21.00
Railroad hvy. m'tng.	21.50 to 22.00
No. 2 hvy. mltng. steel	17.50 to 18.00
No. 2 RR. wrought	20.50 to 21.00
Scrap rails	22.00 to 22.50
Rails 3 ft. and under	24.50 to 25.00
Comp. sheet steel	20.50 to 21.00
Hand bundled sheets	18.50 to 19.00
Hvy. steel axle turn.	18.75 to 19.25
Machine shop turn.	15.00 to 15.50
Short shov. turn.	15.00 to 15.50
Mixed bor. & turn.	15.00 to 15.50
Cast iron borings	15.00 to 15.50
Cast iron carwhee's	20.50 to 21.00
Hvy. breakable cast	17.00 to 17.50
No. 1 cupola cast	19.50 to 20.00
RR. knuckles & cplrs.	25.50 to 26.00
Ra'l coil & leaf springs	25.50 to 26.00
Rolled steel wheels	25.50 to 26.00
Low phos. billet crops	26.00 to 26.50
Low phos. sh. bar	24.50 to 25.00
Low phos. punchings	23.00 to 23.50
Low phos. plate, hvy.	24.00 to 25.00
Low phos. plate clips	22.50 to 23.00
Steel car axles	25.50 to 26.00

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$19.00 to $19.50
No. 2 hvy. m'tng. steel	16.50 to 17.00
Hydraulic bund., new	18.50 to 19.00
Hydraulic bund., old	14.00 to 14.50
Steel rails for rolling	23.00 to 23.50
Cast iron carwheels	20.50 to 21.00
Hvy. breakable cast	19.00 to 19.50
No. 1 cast	20.00 to 20.50
Stove plate (steel wks.)	16.00 to 16.50
Railroad ma leable	20.00 to 21.00
Machine shop turn.	13.50 to 14.00
No. 1 b'ast furnace	12.50 to 13.00
Cast borings	13.00 to 13.50
Heavy axle turnings	15.50 to 16.00
No. 1 low phos. hvy.	23.50 to 24.00
Coup'ers & knuckles	24.50 to 25.00
Rolled steel wheels	24.50 to 25.00
Steel axles	29.00 to 29.50
Shafting	24.00 to 24.50
No. 1 RR. wrought	20.50 to 21.00
Spec. iron & steel pipe	16.00 to 16.50
No. 1 forge fire	16.50 to 17.00
Cast borings (chem.)	14.50 to 15.00

CHICAGO

Delivered to Chicago district consumers:

	Per Gross Ton
Hvy. mltng. steel	$17.75 to $18.25
Auto hvy. mltng. steel, alloy free	16.50 to 17.00
No. 2 auto. steel	14.50 to 15.50
Shoveling steel	17.75 to 18.25
Hydraul. comp. sheets	16.75 to 17.25
Drop forge flashings	15.00 to 15.50
No. 1 busheling	16.75 to 17.25
Rolled carwheels	22.00 to 22.50
Railroad tires, cut	21.50 to 22.00
Railroad 'eaf springs	21.50 to 22.00
Steel coup. & knuckles	21.00 to 21.50
Axle turnings	17.00 to 17.50
Coil springs	23.00 to 23.50
Axle turn. (elec.)	18.00 to 18.50
Low phos. punchings	21.50 to 22.00
Low phos. plates, 12 in. and under	21.00 to 21.50
Cast iron borings	11.00 to 11.50
Short shov. turnings	11.50 to 12.00
Machine shop turn.	9.50 to 10.00
Rero'ling ra'ls	20.75 to 21.25
Steel rails under 3 ft.	20.75 to 21.25
Steel rails under 2 ft.	21.25 to 21.75
Angle bars, steel	20.75 to 21.25
Cast iron carwhee's	19.00 to 19.50
Railroad malleable	19.00 to 19.50
Agric. malleable	16.00 to 16.50
	Per Net Ton
Iron car axles	$25.50 to $26.00
Steel car axles	25.50 to 26.00
No. 1 RR. wrought	15.50 to 16.00
No. 2 RR. wrought	16.00 to 16.50
No. 2 busheling, old	8.50 to 9.00
Locomotive tires	18.50 to 19.00
Pipes and flues	13.00 to 13.50
No. 1 machinery cast	14.50 to 15.00
Clean auto. cast	14.50 to 15.00
No. 1 railroad cast	14.00 to 14.50
No. 1 agric. cast	13.00 to 13.50
Stove plate	11.50 to 12.00
Grate bars	12.00 to 12.50
Brake shoes	12.00 to 12.50

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$20.00 to $20.50
Hydraulic bundles	19.00 to 19.50
Machine shop turn.	14.50 to 15.00

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. mltng. steel	$18.50 to $19.00
No. 2 hvy. mltng. steel	17.50 to 18.00
Comp. sheet steel	17.50 to 18.00
Light bund. stampings	14.00 to 14.50
Drop forge flashings	17.00 to 17.50
Machine shop turn.	12.50 to 13.00
Short shov. turn.	12.50 to 13.00
No. 1 busheling	17.50 to 18.00
Steel axle turnings	15.00 to 15.50
Low phos. billet and bloom crops	24.50 to 25.00
Cast iron borings	14.00 to 14.50
Mixed bor. & turn.	14.00 to 14.50
No. 2 busheling	13.00 to 13.50
No. 1 cast	19.00 to 19.50
Railroad grate bars	11.50 to 12.00
Stove plate	11.00 to 11.50
Rails under 3 ft.	23.00 to 24.00
Rails for rollings	21.00 to 21.50
Railroad malleable	22.00 to 22.50
Cast iron carwheels	21.00

BUFFALO

Per gross ton, f.o.b. consumers' plants:

No. 1 hvy. mltng. steel	$19.00 to $19.50
No. 2 hvy. mltng. steel	17.00 to 17.50
Scrap rails	19.50 to 20.00
New hvy. b'nd'ed sheet	17.00 to 17.50
Old hydraul. bundles	16.00 to 16.50
Drop forge flashings	17.00 to 17.50
No. 1 busheling	17.00 to 17.50
Hvy. axle turnings	14.50 to 15.00
Machine shop turn.	12.50 to 13.00
Knuckles & couplers	21.50 to 22.00
Coil & leaf springs	21.50 to 22.00
Rolled steel wheels	21.50 to 22.00
Low phos. billet crops	22.00 to 22.50
Shov. turnings	14.00 to 14.50
Mixed bor. & turn.	12.50 to 13.00
Cast iron borings	12.50 to 13.00
Steel car axles	20.50 to 21.00
No. 1 machinery cast	19.00 to 19.50
No. 1 cupola cast	17.50 to 18.00
Stove plate	16.00 to 16.50
Steel rails under 3 ft.	22.50 to 23.00
Cast iron carwheels	16.50 to 17.00
Railroad malleable	20.00 to 21.00
Chemical borings	13.50 to 14.00

ST. LOUIS

Dealer's buying prices per gross ton delivered to consumer:

Selected hvy. mltng.	$17.50 to $18.00
No. 1 hvy. melting	17.25 to 17.75
No. 2 hvy. me'ting	15.50 to 16.00
No. 1 locomotive tires	19.00 to 19.50
Misc. stand.-sec. rails	18.00 to 18.50
Railroad springs	21.00 to 21.50
Bundled sheets	12.00 to 12.50
No. 2 RR. wrought	17.50 to 18.00
No. 1 busheling	12.00 to 12.50
Cast bor. & turn.	8.50 to 9.00
Rails for rolling	19.50 to 20.00
Machine shop turn.	9.00 to 9.50
Heavy turnings	13.50 to 14.00
Steel car axles	23.00 to 23.50
Iron car axles	24.00 to 24.50
No. 1 RR. wrought	15.00 to 15.50
Steel rails under 3 ft.	20.00 to 20.50
Steel angle bars	19.00 to 19.50
Cast iron carwheels	18.00 to 18.50
No. 1 machinery cast	14.00 to 14.50
Railroad malleable	19.50 to 20.00
No. 1 railroad cast	14.00 to 14.50
Stove plate	12.50 to 13.00
Agricul. malleable	12.50 to 13.00
Grate bars	12.00 to 12.50
Brake shoes	12.00 to 12.50

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	$15.50 to $16.00
No. 2 hvy. mltng. steel	12.50 to 13.00
Scrap ra'ls for mltng.	19.50 to 20.00
Loose sheet clippings	11.50 to 12.00
Hydrau. b'ndled sheets	15.50 to 16.00
Cast iron borings	8.50 to 9.00
Machine shop turn.	10.00 to 10.50
No. 1 busheling	13.50 to 14.00
No. 2 busheling	7.50 to 8.00
Rails for ro'ling	21.50 to 22.00
No. 1 locomotive tires	18.00 to 18.50
Short rails	22.00 to 22.50
Cast iron carwheels	16.50 to 17.00
No. 1 machinery cast	14.00 to 14.50
No. 1 railroad cast	13.00 to 13.50
Burnt cast	10.00 to 10.50
Stove plate	10.00 to 10.50
Agricult. malleable	15.50 to 16.00
Railroad mal'eable	17.50 to 18.00
Mixed hvy. cast	12.00 to 12.50

BIRMINGHAM

Per gross ton delivered to consumer:

Hvy. melting steel	$16.00 to $16.50
Scrap steel rails	17.00
Short shov. turnings	8.50
Stove plate	10.50
Steel axles	18.00 to 19.00
Iron axles	15.50 to 18.00
No. 1 RR. wrought	13.00 to 15.00
Rails for rolling	18.00 to 20.00
No. 1 cast	16.00 to 18.00
Tramcar wheels	16.00 to 18.00

DETROIT

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	$16.00 to $16.50
No. 2 hvy. mltng. steel	15.00 to 15.50
Borings and turnings	11.75 to 12.25
Long turnings	11.50 to 12.00
Short shov. turnings	13.00 to 13.50
No. 1 machinery cast	16.00 to 16.50
Automotive cast	16.75 to 17.25
Hvy. breakable cast	14.50 to 15.00
Hydraul. comp. sheets	18.00 to 18.50
Stove plate	10.50 to 11.00
New factory bushel	16.00 to 16.50
Old No. 2 busheling	10.50 to 11.00
No. 2 busheling (black fender stock)	13.00 to 13.50
Sheet clippings	13.50 to 14.00
Flashings	15.75 to 16.25
Low phos. plate scrap	17.50 to 18.00

NEW YORK

Dealers' buying prices per gross ton on cars:

No. 1 hvy. mltng. steel	$15.50 to $16.00
No. 2 hvy. mltng. steel	14.00 to 14.50
Hvy. breakable cast	14.75 to 15.00
No. 1 machinery cast	15.50 to 16.00
No. 2 cast	14.50 to 15.00
Stove plate	12.00 to 12.50
Steel car axles	27.00 to 27.50
Shafting	19.50 to 20.00
No. 1 RR. wrought	17.00 to 17.50
No. 1 wrought long	16.50 to 17.00
Spec. iron & steel pipe	13.00 to 13.50
Rails for rolling	19.00 to 19.50
Clean steel turnings	9.50 to 10.00
Cast borings	9.00 to 9.50
No. 1 blast furnace	9.00 to 9.50
Cast borings (chem.)	12.50 to 13.00
Unprepar. yard scrap	10.50 to 11.50
Per gross ton, delivered local foundries:	
No. 1 machn. cast	$17.50 to $18.50
No. 1 hvy. cast cupola	14.50 to 15.00
No. 2 cast	14.00 to 14.50

BOSTON

Dealers' buying prices per gross ton:

No. 1 hvy. mltng. steel	$14.80 to $15.30
Scrap rails	14.80 to 15.30
No. 2 steel	13.80 to 14.30
Breakable cast	15.00 to 15.10
Machine shop turn.	9.30
Mixed bor. & turn.	9.30
Bund. skeleton long	12.00 to 12.25
Shafting	19.00 to 19.50
Cast bor. chemical	9.00 to 10.00
Per gross ton delivered consumers' yards:	
Textile cast	$18.00 to $19.00
No. 1 machine cast	18.00 to 19.00

CANADA

Dealers' buying prices at their yards, per gross ton

	Toronto	Montreal
No. 1 hvy. mltng. stl.	$14.50	$14.00
No. 2 hvy. mltng. stl.	13.50	13.00
Mixed dealers steel	12.50	12.00
Scrap pipe	11.75	11.50
Steel turnings	9.75	9.50
Cast borings	11.00	10.50
Machinery cast	18.00	17.00
Dealers cast	16.00	15.00
Stove plate	13.00	11.00

EXPORT

Dealers' buying prices per gross ton:

New York, truck lots, delivered, harbor.

No. 1 hvy. mltng. steel	$16.50 to $17.50
No. 2 hvy. mltng. steel	15.50 to 16.50
No. 2 cast	14.50 to 15.00
Stove plate	12.50 to 13.00

Boston on cars at Army Base or Mystic Wharf

No. 1 hvy. mltng. steel	$18.00
No. 2 hvy. mltng. steel	17.00
Rails (scrap)	18.00

Philadelphia, delivered alongside boats, Port Richmond

No market at present.

PRICES ON FINISHED AND SEMI-FINISHED IRON AND STEEL

SEMI-FINISHED STEEL

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham. Prices at Duluth are $2 a ton higher, and delivered Detroit $3 higher.

	Per Gross Ton
Rerolling	$37.00
Forging quality	43.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$37.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	2.10c.

Wire Rods
(No. 5 to 9/32 in.)

	Per Gross Ton
F.o.b. Pittsburgh or Cleveland	$47.00
F.o.b. Chicago, Youngstown or Anderson, Ind.	48.00
F.o.b. Worcester, Mass.	49.00
F.o.b. Birmingham	50.00
F.o.b. San Francisco	56.00
F.o.b. Galveston	53.00

Rods over 9/32 in. to 47/64 in., inclusive, $5 a ton over base.

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh	2.45c.
F.o.b. Chicago or Gary	2.50c.
F.o.b. Duluth	2.60c.
Del'd Detroit	2.60c.
F.o.b. Cleveland	2.50c.
F.o.b. Buffalo	2.55c.
Del'd Philadelphia	2.74c.
Del'd New York	2.78c.
F.o.b. Birmingham	2.60c.
F.o.b. cars dock Gulf ports	2.85c.
F.o.b. cars Pacific Ports	3.00c.

Rail Steel
(For merchant trade)

F.o.b. Pittsburgh	2.30c.
F.o.b. Cleveland, Chicago, Gary or Moline, Ill.	2.35c.
F.o.b. Buffalo	2.40c.
F.o.b. Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.70c.
F.o.b. cars dock Pacific ports	2.85c.

Billet Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.55c.
F.o.b. Buffalo, Cleveland, Youngstown, Ch/cago, Gary or Birmingham	2.60c.
Del'd Detroit	2.70c.
F.o.b. cars dock Gulf ports	2.95c.
F.o.b. cars dock Pacific ports	2.95c.

Rail Steel Reinforcing
(Straight lengths as quoted by distributers)

F.o.b. Pittsburgh	2.40c.
F.o.b. Buffalo, Cleveland, Youngstown, Chicago, Gary or Birmingham	2.45c.
F.o.b. cars dock Gulf ports	2.80c.
F.o.b. cars dock Pacific ports	2.80c.

Iron

F.o.b. Chicago	2.40c.
F.o.b. Pittsburgh (refined)	3.60c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	2.90c.
F.o.b. Cleveland, Chicago and Gary	2.95c.
F.o.b. Buffalo	3.00c.
F.o.b. Detroit	2.95c.

* In quantities of 10,000 to 19,999 lb.

Plates

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago or Gary	2.30c.
Del'd Cleveland	2.435c.
F.o.b. Coatesville or Spar. Pt.	2.35c.
Del'd Philadelphia	2.435c.
Del'd New York	2.53c.
F.o.b. Birmingham	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.
Wrought iron plates, f.o.b. Pittsburgh	3.80c.

Floor Plates

F.o.b. Pittsburgh	3.50c.
F.o.b. Chicago	3.55c.
F.o.b. Coatesville	3.60c.
F.o.b. cars dock Gulf ports	3.90c.
F.o.b. cars dock Pacific ports	4.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	2.25c.
F.o.b. Chicago	2.30c.
Del'd Cleveland	2.435c.
F.o.b. Buffalo or Bethlehem	2.35c.
Del'd Philadelphia	2.455c.
Del'd New York	2.5025c.
F.o.b. Birmingham (standard)	2.40c.
F.o.b. cars dock Gulf ports	2.65c.
F.o.b. cars dock Pacific ports	2.80c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.60c.
F.o.b. Chicago or Buffalo	2.70c.
F.o.b. cars dock Gulf or Pacific Coast ports	3.05c.

RAILS AND TRACK SUPPLIES

F.o.b. Mill

Standard rails, heavier than 60 lb., per gross ton	$42.50
Angle bars, per 100 lb.	2.80

F.o.b. Basing Points

Light rails (from billets) per gross ton	$43.00
Light rails (from rail steel) per gross ton	42.00

	Base per Lb.
Spikes	3.15c.
Tie plates, steel	2.30c.
Tie plates, Pacific Coast ports	2.40c.
Track bolts, to steam railroads	4.35c.
Track bolts, to jobbers, all sizes (per 100 counts)	65-5 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa., Buffalo; on spikes alone, Youngstown, Lebanon, Pa., Richmond, Va.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	2.40c.
No. 10, f.o.b. Gary	2.50c.
No. 10, del'd Detroit	2.60c.
No. 10, del'd Philadelphia	2.69c.
No. 10, f.o.b. Granite City	2.60c.
No. 10, f.o.b. Birmingham	2.55c.
No. 10, f.o.b. cars dock Pacific ports	2.95c.
No. 10 wrought iron, Pgh.	4.25c.

Hot-Rolled Annealed

No. 24, f.o.b. Pittsburgh	3.15c.
No. 24, f.o.b. Gary	3.25c.
No. 24, del'd Detroit	3.35c.
No. 24, del'd Philadelphia	3.44c.
No. 24, f.o.b. Granite City	3.35c.
No. 24, f.o.b. Birmingham	3.30c.
No. 24, f.o.b. cars dock Pacific ports	3.80c.
No. 24, wrought iron, Pittsburgh	5.15c.

Heavy Cold-Rolled

No. 10 gage, f.o.b. Pittsburgh	3.10c.
No. 10 gage, f.o.b. Gary	3.20c.
No. 10 gage, f.o.b. Detroit	3.30c.
No. 10 gage, del'd Philadelphia	3.39c.
No. 10, f.o.b. Granite City	3.30c.
No. 10 gage, f.o.b. Birmingham	3.25c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.70c.

Light Cold-Rolled

No. 20 gage, f.o.b. Pittsburgh	3.55c.
No. 20 gage, f.o.b. Gary	3.65c.
No. 20 gage, del'd Detroit	3.75c.
No. 20 gage, del'd Philadelphia	3.84c.
No. 20, f.o.b. Granite City	3.75c.
No. 20 gage, f.o.b. Birmingham	3.70c.
No. 20 gage, f.o.b. cars, dock, Pacific ports	4.10c.

Galvanized Sheets

No. 24 gage, f.o.b. Pittsburgh	3.80c.
No. 24, f.o.b. Gary	3.90c.
No. 24, del'd Philadelphia	4.09c.
No. 24, f.o.b. Granite City	4.00c.
No. 24, f.o.b. Birmingham	3.95c.
No. 24, f.o.b. cars, dock, Pacific ports	4.40c.
No. 24, wrought iron, Pittsburgh	6.10c.

Electrical Sheets
(*F.o.b. Pittsburgh*)

	Base per Lb.
Field grade	3.35c.
Armature	3.70c.
Electrical	4.20c.
Special Motor	5.10c.
Special Dynamo	5.80c.
Transformer	6.30c.
Transformer Special	7.30c.
Transformer Extra Special	7.80c.

Base gage changed from 28 to 24 gage. Gage extras are the same as those applying on hot-rolled, annealed sheets with few exceptions.

Silicon Strip in coils—Sheet price plus silicon sheet extra width extras plus 25c. per 100 lb. for coils.

Long Ternes

No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	4.10c.
F.o.b. Gary	4.20c.
F.o.b. cars, dock, Pacific ports	4.80c.

Vitreous Enameling Stock

No. 20, f.o.b. Pittsburgh	3.50c.
No. 20, f.o.b. Gary	3.60c.
No. 20, f.o.b. Granite City	3.70c.
No. 20, f.o.b. cars dock Pacific ports	4.10c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh, per lb.	3.30c.
No. 28, Gary	3.40c.
No. 28, f.o.b. Granite City	3.50c.
No. 28, cars dock Pacific ports, boxed	4.175c.

Tin Plate

	Base per Box
Standard cokes, f.o.b. Pittsburgh district mill	$5.35
Standard cokes, f.o.b. Gary	5.45
Standard coke, f.o.b. Granite City	5.55

Above quotations practically the equivalent of previous quotations owing to new method of quoting, effective Jan. 1, 1937.

Special Coated Manufacturing Ternes

	Base per Box
F.o.b. Pittsburgh	*$4.65
F.o.b. Gary	* 4.75
F.o.b. Granite City	4.85

* Customary 7½ per cent discount in effect through 1936 discontinued as of Jan. 1, 1937.

Roofing Terne Plate
(*F.o.b. Pittsburgh*)

(Per Package, 112 sheets, 20 x 28 in.)

8-lb. coating I.C.	$12.00
15-lb. coating I.C.	14.00
20-lb. coating I.C.	15.00
25-lb. coating I.C.	16.00
30-lb. coating I.C.	17.25
40-lb. coating I.C.	19.50

Hot-Rolled Hoops, Bands, Strip and Flats under ¼ in.

	Base per Lb.
All widths up to 24 in., Pittsburgh	2.40c.
All widths up to 24 in., Chicago	2.50c.
All widths up to 24 in., del'd Detroit	2.60c.
All widths up to 24 in., Granite City	2.60c.
All widths up to 24 in., Birmingham	2.55c.
Cooperage stock, Pittsburgh	2.50c.
Cooperage stock, Chicago	2.60c.

Cold-Rolled Strip*

	Base per Lb.
F.o.b. Pittsburgh	3.20c.
F.o.b. Cleveland	3.20c.
Del'd Chicago	3.48c.
F.o.b. Worcester	3.40c.

* Carbon 0.25 and less.

Cold Rolled Spring Steel

		Pittsburgh and Cleveland	Worcester
Carbon	0.25-0.50%	3.20c.	3.40c.
Carbon	.51- .75	4.45c.	4.65c.
Carbon	.76-1.00	6.30c.	6.50c.
Carbon	Over 1.00	8.50c.	8.70c.

Fender Stock

No. 14, Pittsb'gh or Cleveland	3.45c.
No. 20, Pittsb'gh or Cleveland	3.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland)

To Manufacturing Trade

	Per Lb.
Bright wire	2.90c.
Galvanized wire	2.95c.
Spring wire	3.50c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To the Trade

	Base per Keg
Standard wire nails	$2.75
Smoth coated nails	$2.75
Cut nails, carloads	$3.60

	Base per 100 Lb.
Annealed fence wire	$3.20
Galvanized fence wire	3.60
Polished staples	3.45
Galvanized staples	3.70
Barbed wire, galvanized	3.40
Twisted barbless wire	3.40
Woven wire fence, base column.	74
Single loop bale ties, base col.	63

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., mill prices are $3 a ton over Pittsburgh, except for woven wire fence, which is $3 over Pittsburgh and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire and staples, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh.

On nails, staples and barbed wire, prices of $6 a ton over Pittsburgh are also quoted at Beaumont and Orange, Tex.

STEEL AND WROUGHT IRON PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel			*Wrought Iron*		
In.	Black	Galv.	In.	Black	Galv.
⅛	52	31	⅛ & ¼	..+13	+35
¼ to ⅜	..55	38½	½	20	1½
½	....59½	49	¾	26	8
¾	....62½	53	1 & 1¼	..30	14
1 to 3	..64½	55½	1½	34	16½
			2	....33½	16

Lap Weld

2	57	47½	2	....26½	10
2½ & 3	..60	50½	2½ to 3½	27½	12½
3½ to 6	..62	52½	4	....29½	16
7 & 8	..61	50½	4½ to 8	..28½	15
9 & 10	..60½	50	9 to 12	..24½	10
11 & 12	..59½	49			

Butt Weld, extra strong, plain ends

⅛	....50½	36½	⅛ & ¼	..+14	+43
¼ to ⅜	..52½	40½	½	21	4
½	....57½	48½	¾	27	10
¾	....61½	52½	1 to 2	..34	17½
1 to 3	63	55			

Lap Weld, extra strong, plain ends

2	55	46½	2	....29½	13½
2½ & 3	..59	50½	2½ to 4	..35	20½
3½ to 6	..62½	54	4½ to 6	..33½	19
7 & 8	..61½	51	7 & 8	..34½	19½
9 & 10	..60½	50	9 to 12	..28	15½
11 & 12	..59½	49			

On butt-weld and lap-weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 9.46	$ 8.41
1¼ in. o.d.	13 B.W.G.	11.21	9.96
1½ in. o.d.	13 B.W.G.	12.38	11.00
1¾ in. o.d.	13 B.W.G.	14.09	12.51
2 in. o.d.	13 B.W.G.	15.78	14.02
2¼ in. o.d.	13 B.W.G.	17.60	15.63
2½ in. o.d.	12 B.W.G.	19.37	17.21
2¾ in. o.d.	12 B.W.G.	21.22	18.85
2¾ in. od.	12 B.W.G.	22.49	19.98
3 in. o.d.	12 B.W.G.	23.60	20.97
4½ in. o.d.	10 B.W.G.	45.19	40.15
3½ in. o.d.	11 B.W.G.	29.79	26.47
4 in. o.d.	10 B.W.G.	36.96	32.83
5 in. o.d.	9 B.W.G.	56.71	50.38
6 in. o.d.	7 B.W.G.	87.07	77.35

Extra for less-carload quantities:

25,000 lb. or ft. to 29,999 lb. or ft.	5 %
12,000 lb. or ft. to 24,999 lb. or ft.	12½ %
6,000 lb. or ft. to 11,999 lb. or ft.	25 %
2,000 lb. or ft. to 5,999 lb. or ft.	35 %
Under 2,000 lb. or ft.	50 %

CAST IRON WATER PIPE

Per Net Ton

*6-in. and larger, del'd Chicago.	$55.00
6-in. and larger, del'd New York	53.00
*6-in. and larger, Birmingham.	47.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles.	56.00
F.o.b. dock, Seattle	56.00
4-in. f.o.b. dock, San Francisco or Los Angeles	59.00
F.o.b. dock, Seattle	59.00

Class "A" and gas pipe, $3 extra.
4-in. pipe is $3 a ton above 6-in.

Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $46, Birmingham, and $54 delivered Chicago; and 4-in. pipe, $49, Birmingham, and $58 delivered Chicago.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine and carriage bolts:	
⅛ in. x 6 in. and smaller	65 and 5*
Larger and longer up to 1 in.	60 and 10*
1⅛ in. and larger	60 and 5*
Lag bolts	60 and 10*
Plow bolts, Nos. 1, 2, 3 and 7	65 and 5
Hot pressed nuts, and c.p.c. and t nuts, square or hex. blank or tapped:	
⅛ in. and smaller	65
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60

* Less carload lots and less than full container quantity. Less carload lots in full container quantity, an additional 10 per cent discount; carload lots and full container quantity, still another 5 per cent discount.

Semi-finished hexagon nuts, U.S.S. and S.A.E.:	
⅛ in. and smaller	60 and 10
9/16 in. to 1 in. inclusive	60 and 5
1⅛ in. and larger	60
Stove bolts in packages, nuts attached	70
Stove bolts in packages, with nuts separate	70 and 10
Stove bolts in bulk	80

On stove bolts freight is allowed to destination on 200 lb. and over.

Large Rivets

(½-in. and larger)

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland	$3.60
F.o.b. Chicago or Birmingham	3.70

Small Rivets

(7/16-in. and smaller)

Per Cent Off List

F.o.b. Pittsburgh	65 and 5
F.o.b. Cleveland	65 and 5
F.o.b. Chicago and Birmingham	65 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lb. on lots of 200 lb. or more.)

Per Cent Off List

Milled cap screws, 1 in. dia. and smaller	50 and 10
Milled standard set screws, case hardened, 1 in dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws U.S.S. or S.A.E. thread 1 in. and smaller	60
Upset set screws, cup and oval points	75
Milled studs	65

Alloy and Stainless Steel

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $60 a gross ton.

Alloy Steel Bars

F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.

Open-hearth grade, base	3.00c.
Delivered, Detroit	3.15c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
200 (½ % Nickel)	$0.35
2100 (1½ % Nickel)	0.75
2300 (3½ % Nickel)	1.55
2500 (5% nickel)	$2.25
3100 Nickel-chromium	0.70
3200 Nickel-chromium	1.35
3300 Nickel-chromium	3.80
3400 Nickel-chromium	3.20
4100 Chromium-molybdenum (0.15 to 0.25 Molybdenum)	0.55
4100 Chromium-molybdenum (0.25 to 0.40 Molybdenum)	0.75
4600 Nickel-molybdenum (0.20 to 0.30 Mo, 1.50 to 2.00 Ni)	1.10
5100 Chrome steel (0.60-0.90 Cr.)	0.35
5100 Chrome steel (0.80-1.10 Cr.)	0.45
5100 Chromium spring steel	0.15
6100 Chromium-vanadium bar	1.20
6100 Chromium-vanadium spring steel	0.85
Chromium-nickel-vanadium	1.50
Carbon-vanadium	0.85

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base.

Alloy Cold-Finishd Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo, 3.60c. base per lb. Delivered Detroit, 3.75c., carlots.

CORROSION & HEAT RESISTANT ALLOYS

(Base prices, cents per lb., f.o.b. Pittsburgh)

Chrome-Nickel

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25c.	24c.
Plates	29c.	27c.
Structural shapes	25c.	24c.
Sheets	36c.	34c.
Hot-rolled strip	23.50c.	21.50c.
Cold-rolled strip	30c.	28c.
Drawn wire	25c.	24c.

Straight Chrome

	No. 410	No. 430	No. 442	No. 446
Bars	18.50c.	19c.	22.50c.	27.50c.
Plates	21.50c.	22c.	25.50c.	30.50c.
Sheets	26.50c.	29c.	32.50c.	36.50c.
Hot strip	17c.	17.50c.	23c.	28c.
Cold stp.	22c.	22.50c.	28.50c.	36.50c.

TOOL STEEL

High speed	67c.
High-carbon-chrome	43c.
Oil-hardening	24c.
Special	22c.
Extra	18c.
Regular	14c.

Prices for warehouse distribution to all points on or East of Mississippi River are 2c. a lb. higher. West of Mississippi quotations are 3c. a lb. higher.

British and Continental

BRITISH

Per Gross Ton
f.o.b. United Kingdom Ports

Ferromanganese, export	£20 Nominal
Tin plate, per base box	25s. to 25s. 6d.
Steel bars, open-hearth	£11
Beams, open-hearth	£11 2s. 6d.
Channels, open-hearth	£11 7s. 6d.
Angles, open-hearth	£11 2s. 6d.
Black sheets, No. 24 gage	£15
Galvanized sheets, No. 24 gage	£13 15s.

CONTINENTAL

Per Gross Ton, Gold £, f.o.b. Continental Ports

Billets, Thomas	£4 7s. 6d.
Wire rods, No. 5 B.W.G.	£6 15s.
Steel bars, merchant	£6 to £6 5s.
Sheet bars	£4 8s. 6d.
Plate ¼ in. and up	£6 17s. 6d. to £7
Plate 3/16 in. and 5 mm.	£7 2s. 6d.
Sheet, ⅛ in.	£8 9s. 6d.
Beams, Thomas	£5 2s. 6d.
Angles (Basic)	£6 2s. 6d.
Hoops and strip, base	£7 to £7 5s.

IRON AND STEEL WAREHOUSE PRICES

PITTSBURGH*

	Per Net Ton
Plates	3.70c.
Structural shapes	3.70c.
Soft-steel bars and small shapes	3.80c.
Reinforcing steel bars	3.80c.
Cold-finished and screw stock:	
Rounds and hexagons	4.15c.
Squares and flats	4.15c.
Hot rolled strip incl. 3/16 in. thick, under 24 in. wide	4.00c.
Hoops	4.50c.
Hot-rolled annealed sheets (No. 24), 10 or more bundles	4.50c.
Galv. sheets (No. 24), 10 or more bund'es	5.15c.
Hot-rolled sheets (No. 10)	3.75c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$4.48
Spikes, large .....1 to 24 kegs	3.90c.
	Per Cent Off List
Track bolts, all sizes per 100 count	55
Machine bolts, 100 count	**
Carriage bolts, 100 count	**
Nuts, all styles, 100 count	**
Large rivets, base per 100 lb.	$4.35
Wire, black, soft ann'l'd, base per 100 lb.	3.45c.
Wire, galv. soft, base per 100 lb.	3.85c.
Common wire nails, per keg	3.00c.
Cement coated nails, per keg	3.00c.

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lb.

* Delivered in Pittsburgh switching district.

** Prices on application.

CHICAGO *Base per Lb.*

Plates and structural shapes	3.75c.
Soft steel bars, rounds	3.85c.
Soft steel bars, squares and hexagons	4.00c.
Cold-fin. steel bars:	
Rounds and hexagons	4.30c.
Flats and squares	4.30c.
Hot-rolled strip	4.10c.
Hot-ro'led annealed sheets (No. 24)	4.60c.
Galv. sheets (No. 24)	5.25c.
Spikes (keg lots)	$4.40
Track bo ts (keg lots)	5.05
Rivets, structural (keg lots)	**4.95
Rivets, boiler (keg lots)	**5.05
	Per Cent Off List
Machine bolts and carriage bolts, ½ in. and smaller	60
Lag screws	*55 and 5
Hot-pressed nuts, sq. and hex., tap or blank, ½ by 6 in. and smaller	60
Hex. head cap screws	60
Cut point set screws	75
Flat head bright wood screws	62 and 20
Spring cotters	45
Stove bolts in full packages	72½
Rd. hd. tank rivets, 7/16 in. and smaller	55
Wrought washers	$4.00 off list
Black ann'l'd wire per 100 lb. to mfg. trade (No. 14 and heavier)	$4.55
Com. wire nails, 15 kegs or more, per keg	$3.20
Cement c't'd nails, 15 kegs or more, per keg	$3.20

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

* These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 60 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

** Base at 100 lb.

NEW YORK

	Base per Lb.
Plates, ¼ in. and heavier	4.00c.
Structural shapes	3.97c.
Soft steel bars, round	4.12c.
Iron bars, Swed. charcoal	7.00 to 7.25c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	4.57c.
Flats and squares	4.57c.
Cold-rolled: strip, soft and quarter hard	3.92c.
Hoops	4.32c.
Bands	4.32c.
Hot-rolled sheets (No. 10)	4.00 to 4.07c.
Hot-rolled ann'l'd sheets (No. 24*)	4.50 to 4.32c.
Galvanized sheets (No. 24*)	4.50 to 5.47c.
Long terne sheets (No. 24)	5.50 to 6.20c.
Armco iron, galv. (No. 24†)	6.25c.
Toncan iron, galv. (No. 24†)	6.25c.
Galvanneal (No. 24†)	6.60c.
Armco iron, hot-rolled annealed (No. 24†)	5.65c.
Toncan iron, hot-rolled annealed (No. 24†)	5.65c.
Armco iron hot-rolled (No. 10†)	4.60c.
Toncan iron, hot-rolled (No. 10†)	4.60c.
Cold-rolled sheets (No. 20) for quantities 400 to 1499 lb.	
Standard quality	5.40c.
Deep drawing	6.05c.
Stretcher leveled	6.05c.
SAE, 2300, hot-rolled	7.82c.
SAE, 3100, hot-rolled	6.37c.
SAE, 6100, hot-rolled, annealed	10.52c.
SAE, 2300, cold-rolled	9.00c.
SAE, 3100, cold-rolled, annealed	8.55c.
Floor plate, ⅛ in. and heavier	5.60c.
Standard tool steel	12.50c.
Wire, black, annealed (No. 9)	4.25c.
Wire, galv. (No. 9)	4.60c.
Tire steel, 1 x ¼ in. and larger	4.61c.
Open-hearth spring steel	4.75c. to 10.25c.
Common wire nails, base per keg	3.25c.
	Per Cent Off List
Machine bolts, square head and nut: All diameters. Prices on application	
Carriage bolts, cut thread: All diameters. Prices on application	

* No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

† 125 lb. and more.

ST. LOUIS

	Base per Lb.
Plates and struc. shapes	3.99c.
Bars, soft steel (rounds and flats)	4.09c.
Bars, soft steel (squares, hexagons, ovals, half ovals and half rounds)	4.24c.
Cold-fin. rounds, shafting, screw stock	4.54c.
Hot-rolled annealed sheets (No. 24)	4.84c.
Galv. sheets (No. 24*)	5.49c.
Hot-rolled sheets (No. 10)	4.09c.
Black corrug. sheets (No. 24*)	4.89c.
2 galv. corrug. sheets	5.54c.
Structural rivets	4.94c.
Boiler rivets	5.04c.
	Per Cent Off List
Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nts; all quantities	65

* No. 26 and lighter take special prices.

PHILADELPHIA

	Base per Lb.
*Plates, ¼-in. and heavier	3.90c.
*Structural shapes	3.90c.
*Soft steel bars, small shapes, iron bars (except bands)	4.00c.
‡Reinforc. steel bars, sq. twisted and deformed	3.53c.
Cold-finished steel bars	4.53c.
*Steel hoops	4.35c.
*Steel bands, No. 12 and 3/16 in. incl.	4.10c.
*Spring steel	5.50c.
†Hot-rolled anneal. sheets (No. 24)	4.65c.
†Galvanized sheets (No. 24)	5.30c.
*Hot-rolled annealed sheets (No. 10)	4.00c.
*Diam. pat. floor plates, ¼ in.	5.25c.

These prices are for delivery in Philadelphia trucking area.

* Base prices subject to deduction on orders aggregating 4000 lb. or over.

† For 25 bundles or over.

‡ For less than 2000 lb.

CLEVELAND

	Base per Lb.
Plates and struc. shapes	3.86c.
Soft steel bars	3.75c.
†Reinforc. steel bars	2.60c.
‡Cold-finished steel bars	4.30c.
Hot-rolled strip, 6 in. wide and under	4.16c.
Cold-finished strip	3.60c.
Hot-rolled annealed sheets (No. 24)	4.66c.
Galvanized sheets (No. 24)	5.31c.
Hot-rolled sheets (No. 10)	3.91c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.91c.
Floor plates, 3/16 in. and heavier	5.76c.
*Black ann'l'd wire, per 100 lb.	$3.40
*No. 9 galv. wire, per 100 lb.	3.80
*Com. wire nails, base per keg	2.95
	Per Cent Off List
Machine and carriage bolts, small	65 and 5
Large	60 and 10
Nuts, 100 count	
½ in. and smaller	65 and 5
9/16 in. to 1 in.	60 and 10

† Outside delivery 10c. less.

* For 5000 lb. or less.

‡ Plus switching and cartage charges and quantity differentials up to 50c.

CINCINNATI

	Base per Lb.
Plates and struc. shapes	3.95c.
Floor plates	5.55c.
Bars, rounds, flats and angles	4.05c.
Other shapes	4.20c.
Rail steel reinforc. bars	3.75c.
Hoops and bands, 3/16 in. and lighter	4.25c.
Cold-finished bars	4.50c.
Hot-rolled annealed sheets (No. 24) 3500 lb. or more	4.60c.
Galv. sheets (No. 24) 3500 lb. or more	$5.25
Hot-rolled sheets (No. 10)	4.00c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$3.48
Com. wire nails, base per keg:	
Any quantity less than carload	3.20
Cement c't'd nails, base 100-lb. keg	3.50
Chain, lin. per 100 lb.	8.35
	Net per 100 Ft.
Seamless steel boiler tubes, 2-in.	$21.80
4-in.	52.45
Lap-welded steel boiler tubes, 2-in.	20.73
4-in.	48.41

BUFFALO *Base per Lb.*

Plates	3.92c.
Floor plates	5.52c.
Struc. shapes	3.80c.
Soft steel bars	3.90c.
Reinforcing bars	3.10c.
Cold-fin. flats and sq.	4.35c.
Rounds and hex.	4.35c.
Cold-rolled strip steel	3.79c.
Hot-rolled annealed sheets (No. 24)	4.80c.
Heavy hot-rol'ed sheets (3/16 in., 24 to 48 in. wide)	3.97c.
Galv. sheet (No. 24)	5.45c.
Bands	4.22c.
Hoops	4.22c.
Heavy hot-rolled sheets	3.97c.
Com. wire nails, base per keg	$3.26
Black wire, base per 100 lb. (2500-lb. lots or under)	4.55c.
(Over 2500 lb.)	4.45c.

BOSTON

	Base per Lb.
Channels, angles	4.20c.
Tees and zees, under 3"	4.45c.
H beams and shapes	4.07c.
Plates — Sheared, tank and univ. mill, ¼ thick and heavier	4.08c.
Floor plates, diamond pattern	5.13c.
Bar and bar shapes (mild steel)	4.20c.
Bands 3/16 in. thick and No. 12 ga. incl.	4.40 to 5.40
Half rounds, half ovals, ovals and bevels	5.45c.
Tire steel	5.45c.
Cold-rolled strip steel	3.845c.
Cold-finished rounds, squares and hexagons	4.65c.
Cold-finished flats	4.65c.
Blue annealed sheets, No. 10 ga.	3.90c.
One pass cold-rolled sheets No. 24 ga.	4.50c.
Galvanized steel sheets, No. 24 ga.	5.05c.
Lead coated sheets, No. 24 ga.	6.15c.

Price delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

	Base per Lb.
Soft steel bars	3.49c.
Structural shapes	3.95c.
Plates	3.95c.
Floor plates	5.85c.
Hot-rolled annealed sheets (No. 24)*	4.69c.
Hot-rolled sheets (No. 10)	3.94c.
Galvanized sheets (No. 24)*	5.40c.
Bands and hoops	4.19c.
Cold-finished bars	4.30c.
Cold-rolled strip	3.78c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	6.44c.

Quantity differential on bars, plates, structural shapes, bands, hoops, floor plates and heavy hot-rolled: Under 100 lb., 1.50c. over base; 100 to 399 lb., base plus .50c.; 400 to 3999 lb. base; 4000 to 9999 lb., base less .10c.; 10,000 lb. and over, less .15c.

* Under 400 lb., .50c. over base; 400 to 1499 lb., base; 1500 to 3499 lb., base less .10c; 3500 lb. and over, base less 15c.

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials covering shipment at one time.

Galvanized and hot-rolled annealed may not be combined to obtain quantity deductions.

MILWAUKEE

	Base per Lb.
Plates and structural shapes	3.86c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.96c.
Soft steel bars, squares and hexagons	4.11c.
Hot-rolled strip	4.21c.
Hot-rolled annealed sheets (No. 24)	4.71c.
Galvanized sheets (No. 24)	5.36c.
Cold-finished steel bars	4.41c.
Structural rivets (keg lots)	5.16c.
Boiler rivets, cone head (keg lots)	5.26c.
Track spikes (keg lots)	4.61c.
Track bolts (keg lots)	5 81c.
Black annealed wire (No. 6 to No. 9 incl.)	4.05c.
Com. wire nails and cement coated nails 1 to 14 kegs	3.25c.

	Per Cent Off List
Machine bolts and carriage bolts, ½x6 and smaller or shorter	65
Larger and longer up to 1 in., diam.	60-5
1⅛ in. and larger	60
Coach and lag screws	60-5
Hot-pressed nuts, sq. and hex. tapped or blank, 1-199 lb.	50
200 lb. and over:	
⅛ in. and smaller	62½
9/16 to 1 in.	60
1⅛ in. and over	50

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 3999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

	Base per Lb.
Mild steel bars, rounds	4.10c.
Structural shapes	4.00c.
Plates	4.00c.
Cold-finished bars	4.55c.
Hot-rolled annealed sheets, No. 24	4.85c.
Galvanized sheets, No. 24	5.50c.

On mild steel bars, shapes and plates the base applies on 400 to 14,999 lb. On hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over. Base on cold-finished bars is 1000 lb. and over of a size.

BALTIMORE

	Base per Lb.
Mild steel bars and small shapes	4.00c.
Structural shapes	3.90c.
Reinforcing bars, 5 to 15 tons	3.16c.
Plates	3.90c.
Hot-rolled sheets, No. 10	3.95c.
Bands	4.20c.
Hoops	4.45c.
Special threading steel	4.15c.
Checkered floor plates ¼ in. and heavier	5.50c.
Galvanized sheets, No. 24, 100 bdls. or more	$4.70
Cold-rolled rounds, hexagons, squares and flats, 1000 lb. and more	$4.50

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets the base applies on orders 400 to 3999 lb.

All prices are f.o.b. consumers' plants.

For second zone add 10c. per 100 lb. for trucking.

CHATTANOOGA

	Base per Lb.
Mild steel bars	4.21c.
Iron bars	4.21c.
Reinforcing bars	4.21c.
Reinforcing shapes	4.11c.
Plates	4.11c.
Hot-rolled sheets No. 10	4.16c.
Hot-rolled annealed sheets, No. 24*	4.06c.
Galvanized sheets No. 24*	4.76c.
Steel bands	4.41c.
Cold-finished bars	4.86c.

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* Plus mill item extra.

MEMPHIS

	Base per Lb.
Mild steel bars	4.31c.
Shapes, bar size	4.31c.
Iron bars	4.31c.
Structural shapes	4.21c.
Plates	4.21c.
Hot-rolled sheets, No. 10	4.26c.
Hot-rolled annealed sheets, No. 24	4.91c.
Galvanized sheets, No. 24	5.66c.
Steel bands	4.56c.
Cold-drawn rounds	4.80c.
Cold-drawn flats, squares, hexagons	6.80c.
Structural rivets	5.15c.
Bolts and nuts, per cent off list	55
Small rivets, per cent off list	55

NEW ORLEANS

	Base per Lb.
Mild steel bars	4.20c.
Reinforcing bars	3.24c.
Structural shapes	4.10c.
Plates	4.10c.
Hot-rolled sheets, No. 10	4.35c.
Steel bands	4.75c.
Cold-finished steel bars	5.10c.
Structural rivets	4.85c.
Boiler rivets	4.85c.
Common wire nails, base per keg	$3.55
Bolts and nuts, per cent off list	60

PACIFIC COAST

	Base per Lb. San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	4.05c.	4.30c.	4.25c.
Shapes, standard	4.05c.	4.30c.	4.25c.
Soft steel bars	4.20c.	4.30c.	4.45c.
Reinforcing bars, f.o.b. cars dock Pacific ports	2.975c.	2.975c.	3.625c.
Hot-rolled annealed sheets (No. 24)	5.15c.	5.05c.	5.35c.
Hot-rolled sheets (No. 10)	4.30c.	4.50c.	4.50c.
Galv. sheets (No. 24 and lighter)	5.35c.	5.55c.	5.90c.
Galv. sheets (No. 22 and heavier)	6.10c.	5.70c.	5.90c.
Cold-finished steel Rounds	6.80c.	6.85c.	7.10c.
Squares and hexagons	8.05c.	8.10c.	7.10c.
Flats	8.55c.	8.60c.	8.10c.
Common wire nails—base per keg less carload	$3.65	$3.60	$3.70

All items subject to differentials for quantity.

REFRACTORIES PRICES

Fire Clay Brick

	Per 1000 f.o.b. Works
First quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	$54.00
First quality, New Jersey	56.00
Select, Ohio	49.00
Second quality, Pennsylvania, Maryland, Kentucky, Missouri and Illinois	49.00
Second quality, New Jersey	51.00
No. 1, Ohio	46.00
Ground fire clay, per ton	8.00

5 per cent trade discount on fire clay brick, except for New Jersey, quoted at net price.

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$54.00
Chicago District	63.00
Birmingham	54.00
Silica cement per net ton (Eastern)	9.50

5 per cent trade discount on silica brick.

Chrome Brick

	Per Net Ton
Standard f.o.b. Baltimore, Plymouth Meeting and Chester	$49.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	49.00

Magnesite Brick

	Per Net Ton
Standard f.o.b. Baltimore and Chester, Pa.	$69.00
Chemically bonded, f.o.b. Baltimore	59.00

Grain Magnesite

	Per Net Ton
Imported, f.o.b. Baltimore and Chester, Pa. (in sacks)	$45.00
Domestic, f.o.b. Baltimore and Chester, in sacks	43.00
Domestic, f.o.b. Chewelah, Wash.	25.00

RAW MATERIALS PRICES

PIG IRON

No. 2 Foundry

F.o.b. Everett, Mass.	$25.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa., and Sparrows Point, Md.	25.00
Delivered Brooklyn	27.27
Delivered Newark or Jersey City	26.39
Delivered Philadelphia	25.76
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Buffalo, Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	24.00
F.o.b. Jackson, Ohio	25.75
Delivered Cincinnati	24.07
F.o.b. Duluth	24.50
F.o.b. Provo, Utah	22.00
Delivered San Francisco, Los Angeles or Seattle	$26.50
F.o.b. Birmingham*	20.38

* Delivered prices on southern iron for shipment to northern points are 38c. a ton below delivered prices from nearest northern basing point on iron with phosphorus content of 70 and over.

Malleable

Base prices on malleable iron are 50c. a ton above No. 2 foundry quotations at Everett. Eastern Pennsylvania furnaces, Erie and Buffalo. Elsewhere they are the same.

Basic

Fo.b. Everett, Mass.	$25.75
F.o.b. Bethlehem, Birdsboro, Swedeland and Steelton, Pa., and Sparrows Point, Md.	24.50
F.o.b. Buffalo	23.00
F.o.b. Neville Island, Sharpsville and Erie, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago and Granite City, Ill.	23.50
Delivered Cincinnati	24.51
Delivered Canton, Ohio	24.76
Delivered Mansfield, Ohio	25.26
F.o.b. Jackson, Ohio	25.50
F.o.b. Birmingham	19.00

Bessemer

F.o.b. Everett, Mass.	$26.75
F.o.b. Bethlehem, Birdsboro and Swedeland, Pa.	26.00
Delivered Boston Switching District	26.50
Delivered Newark or Jersey City	27.39
Delivered Philadelphia	26.76
F.o.b. Buffalo and Erie, Pa., and Duluth	25.00
F.o.b. Neville Island and Sharpsville, Pa.; Youngstown, Cleveland, Toledo and Hamilton, Ohio; Detroit; Chicago	24.50
F.o.b. Birmingham	25.00
Delivered Cincinnati	25.51
Delivered Canton, Ohio	25.76
Delivered Mansfield, Ohio	26.26

Low Phosphorus

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y.	$28.50

Gray Forge

Valley or Pittsburgh furnace	$23.50

Charcoal

Lake Superior furnace	$27.00
Delivered Chicago	30.04

Canadian Pig Iron

Per Gross Ton

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$26.50
No. 2 fdy., sil. 1.75 to 2.25	25.50
Malleable	26.00
Basic	25.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$27.50
No. 2 fdy., sil. 1.75 to 2.25	27.00
Malleable	27.50
Basic	27.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

Per Gross Ton

Domestic, 80% (carload)	$102.50

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$33.00
F.o.b. New Orleans	33.00

Electric Ferrosilicon

Per Gross Ton Delivered

50% (carloads)	$69.50
50% (ton lots)	77.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

Per Gross Ton

F.o.b. Jackson, Ohio, 5.00 to 5.50%	$27.50

For each additional 0.5% silicon up to 17%, 50c. a ton is added.

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese, each unit over 2%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton

10.00 to 10.50%	$33.50
10.51 to 11.00%	34.00
11.01 to 11.50%	34.50
11.51 to 12.00%	35.00
12.01 to 12.50%	35.50
12.51 to 13.00%	36.00
13.01 to 13.50%	36.50
13.51 to 14.00%	37.00
14.01 to 14.50%	37.50
14.51 to 15.00%	38.00
15.01 to 15.50%	38.50
15.51 to 16.00%	39.00
16.01 to 16.50%	39.50
16.51 to 17.00%	40.00

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 a ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W del., carloads, nominally	$1.80
Ferrotungsten, lots of 5000 lbs., nominally	1.85
Ferrotungsten, smaller lots, nominally	1.90
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr per lb. contained Cr delivered, in carloads, and contract	10.50c.*
Ferrochromium, 2% carbon	16.50c. to 17.00c.*
Ferrochromium, 1% carbon	17.50c. to 18.00c.*
Ferrochromium, 0.10% carbon	19.50c. to 20.00c.*
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.*
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocolumbium, per lb. contained columbium, f.o.b. Niagara Falls, N. Y.	$2.50*
Ferrocarbontitanium, 15 to 18% Ti, 7 to 8% C, f.o.b. furnace carload and contract per net ton	$142.50
Ferrocarbontitanium, 17 to 20% Ti, 3 to 5% C, f.o.b. furnace, carload and contract, per net ton	$157.50
Ferrophosphorus, electric, or blast furnace material, in carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage, freight equalized with Rockdale, Tenn., per gross ton	63.50
Ferrophosphorus, electric, 24%, in carlots, f.o.b. Anniston, Ala., per gross ton with $3 unitage, freight equalized with Nashville, Tenn.	80.00
Ferromolybdenum, per lb. Mo del.	95c.
Calcium molybdate, per lb. Mo del.	80c.
Silico spiegel, per ton, f.o.b. furnace, carloads	$45.00
Ton lots or less, per ton	50.00
Silico-manganese, gross ton, delivered.	
3%	101.50
2.50% carbon grade	106.50
2% carbon grade	111.50
1% carbon grade	121.50

* Spot prices are $5 a ton higher. Spot premium on 75 per cent ferrosilicon is $10 a ton.

ORES

Lake Superior Ores

Delivered Lower Lake Ports

Per Gross Ton

Old range, Bessemer, 51.50%	$5.25
Old range, non-Bessemer, 51.50%	5.10
Mesabi, Bessemer, 51.50%	5.10
Mesabi, non-Bessemer, 51.50%	$4.35
High phosphorus, 51.50%	4.85

Foreign Ore

C.i.f. Philadelphia or Baltimore

Per Unit

Iron, low phos., copper free, 55 to 58% dry, Algeria, nominal	17.00c.
Iron, low phos., Swedish, average, 68½% iron	Nominal
Iron, basic or foundry, Swedish, aver. 65% iron	Nominal
Iron, basic or foundry, Russian, aver. 65% iron	Nominal
Man., Caucasian, washed 52%	52c.
Man., African, Indian, 44-48%	Nominal
Man., African, Indian, 49-51%	Nominal
Man., Brazilian, 46 to 48½%	Nominal

Per Net Ton Unit

Tungsten, Chinese, wolframite, duty paid, delivered, nominal	$28.00 to $30.00
Tungsten, domestic, scheelite delivered, nominally	$25.00 to $29.00
Chrome ore (lump) c.i.f. Atlantic Seaboard, per gross ton:	
South African (low grade)	$16.00
Rhodesian, 45%	23.00
Rhodesian, 48%	26.75
Turkish, 48-49%	25.50 to $26.50
Turkish, 45-46%	23.50 to 24.00
Turkish, 44%	19.00 to 19.50
Chrome concentrates (Turkish) c.i.f. Atlantic Seaboard, per gross ton:	
50%	$25.50 to $26.50
48-49%	24.50 to 25.00

FLUORSPAR

Per Net Ton

Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines, all rail	$20.00
Domestic, barge and rail	22.00
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	$22.00 to 23.00
Foreign, 85% calcium, fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	24.50
Domestic No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	35.00

FUEL OIL

Per Gal.

F.o.b. Bayonne or Baltimore, No. 3 distillate	5.25c.
F.o.b. Bayonne or Baltimore, No. 4 industrial	5.25c.
Del'd Ch'go, No. 3 industrial	4.15c.
Del'd Ch'go, No. 5 industrial	4.00c.
Del'd Cleve'd, No. 3 distillate	5.75c.
Del'd Cleve'd No. 4 industrial	5.75c.
Del'd Cleve'd. No. 5 industrial	5.00c.

COKE AND COAL

Coke *Per Net Ton*

Furnace, f.o.b. Connellsville, Prompt	$4.25 to $4.50
Foundry, f.o.b. Connellsville, Prompt	5.00 to 6.25
Foundry, by-product, Chicago ovens	10.25
Foundry, by-product, del'd New England	12.50
Foundry, by-product, del'd Newark or Jersey City	10.85 to 11.30
Foundry, by-product, Philadelphia	10.60
Foundry, by-product, delivered Cleveland	11.00
Foundry, by-product, delivered Cincinnati	10.50
Foundry, Birmingham	7.50
Foundry, by-product, del'd St. Louis industrial district	11.00 to 11.50
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports	14.75

Coal *Per Net Ton*

Mine run steam coal, f.o.b. W. Pa. mines	$1.50 to $1.75
Mine run coking coal, f.o.b. W. Pa.	1.75 to 1.90
Gas coal, ¾-in. f.o.b. Pa. mines	2.00 to 2.25
Mine run gas coal, f.o.b. Pa. mines	1.80 to 2.00
Steam slack, f.o.b. W. Pa. mines	1.00 to 1.25
Gas slack, f.o.b. W. Pa. mines	1.20 to 1.45

NIAGARA
BRAND
FERRO - ALLOYS

For High Quality Steels

FERRO SILICON
ALL GRADES

FERRO CHROMIUM
HIGH CARBON

FERRO CHROMIUM
LOW CARBON

FERRO MANGANESE

SILICO MANGANESE

PITTSBURGH METALLURGICAL CO., Inc.

NIAGARA FALLS, N. Y.

Sales Offices: NEW YORK—30 Church St. ● PITTSBURGH—Oliver Bldg. ● CLEVELAND—Hanna Bldg.

. . . NON-FERROUS . . .

. . . Stock market weakness influences non-ferrous demand.

o o o

. . . Zinc ore shipments decrease 1446 tons; output unchanged.

o o o

. . . Tin quota reaffirmed for fourth quarter.

NEW YORK, Sept. 14.—The sharp decline in prices of securities has had a marked effect on domestic non-ferrous markets, keeping new buying considerably below what would be normal for this time of the year. New copper business is in small quantity, with December positions most frequently sought. Sales for the month, through Saturday, totaled 8664 tons. Quotations are still unchanged at 14c. per lb., Connecticut Valley, for the electrolytic grade. Export prices, after showing new strength earlier in the week, went into a decline yesterday and by today had reached 13.70 to 13.75c. per lb., c.i.f., usual Continental base ports, a drop of 0.20c. from the price of a week ago.

The Week's Prices. Cents Per Pound for Early Delivery

	Sept. 9	Sept. 10	Sept. 11	Sept. 13	Sept. 14
Electrolytic copper, Conn.*	14.00	14.00	14.00	14.00	14.00
Lake copper, N. Y.	14.125	14.125	14.125	14.125	14.125
Straits tin, spot, New York	59.25	59.625	....	59.625	59.75
Zinc, East St. Louis	7.25	7.25	7.25	7.25	7.25
Zinc, New York	7.60	7.60	7.60	7.60	7.60
Lead, St. Louis	6.35	6.35	6.35	6.35	6.35
Lead, New York	6.50	6.50	6.50	6.50	6.50

*Delivered Connecticut Valley; price ¼c. lower delivered in New York.
Aluminum, virgin 99 per cent plus 20.00c.-21.00c. a lb., delivered.
Aluminum No. 12 remelt No. 2 standard, in carloads, 19.00c. to 19.50c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 18.25c. a lb., prompt, f.o.b., New York.
Antimony, American, 15.75c. per lb., prompt shipment, New York.
Quicksilver, $90.00 to $92.00 per flask of 76 lb.
Brass ingots, commercial 85-5-5-5, 14.25c. a lb., less carload, delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	60.75c. to 61.75c.
Tin, bar	62.75c. to 63.75c.
Copper, Lake	15.00c. to 16.00c.
Copper, electrolytic	15.00c. to 16.00c.
Copper, castings	14.75c. to 15.75c.
*Copper sheets, hot-rolled	21.78c.
*High brass sheets.	19.75c.
*Seamless brass tubes	22.50c.
*Seamless copper tubes	22.625c.
*Brass rods	16.25c.
Zinc, slabs	8.75c. to 9.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	13.00c.
Lead, American pig.	7.50c. to 8.50c.
Lead, bar	8.50c. to 9.50c.
Lead, sheets, cut	10.00c.
Antimony, Asiatic	18.50c. to 19.50c.
Alum., virgin, 99 per cent plus	22.50c. to 24.00c.
Alum., No. 1 for remelting, 98 to 99 per cent	19.50c. to 21.00c.
Solder, ½ and ½	35.00c. to 36.00c.
Babbitt metal, commercial grade	25.00c. to 65.00c.

*These prices, which are also for delivery from Chicago and Cleveland warehouses, are quoted with 33⅓ per cent allowed off for extras, except copper tubes and brass rods, on which allowance is 40 per cent.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin Straits pig	63.625c.
Tin, bar	65.625c.
Copper, Lake	15.00c. to 15.25c.
Copper, electrolytic	15.00c. to 15.25c.
Copper, castings	14.75c. to 15.00c.
Zinc, slabs	8.75c. to 9.00c.
Lead, American pig.	7.00c. to 7.25c.
Lead, bar	10.50c. to 11.00c.
Antimony, Asiatic	17.88c.
Babbitt metal, medium grade	26.25c.
Babbitt metal, high grade	67.625c.
Solder, ½ and ½	40.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	10.875c.	11.625c.
Copper, hvy. and wire	10.25c.	10.75c.
Copper, light and bottoms	9.25c.	9.50c.
Brass, heavy	6.25c.	6.875c.
Brass, light	5.125c.	5.375c.
Hvy. machine composition	9.125c.	9.625c.
No. 1 yel. brass turnings	7.50c.	8.00c.
No. 1 red brass or compos. turnings	8.875c.	9.375c.
Lead, heavy	5.125c.	5.50c.
Cast aluminum	12.125c.	13.25c.
Sheet aluminum	13.25c.	14.75c.
Zinc	4.00c.	4.375c.

Tin

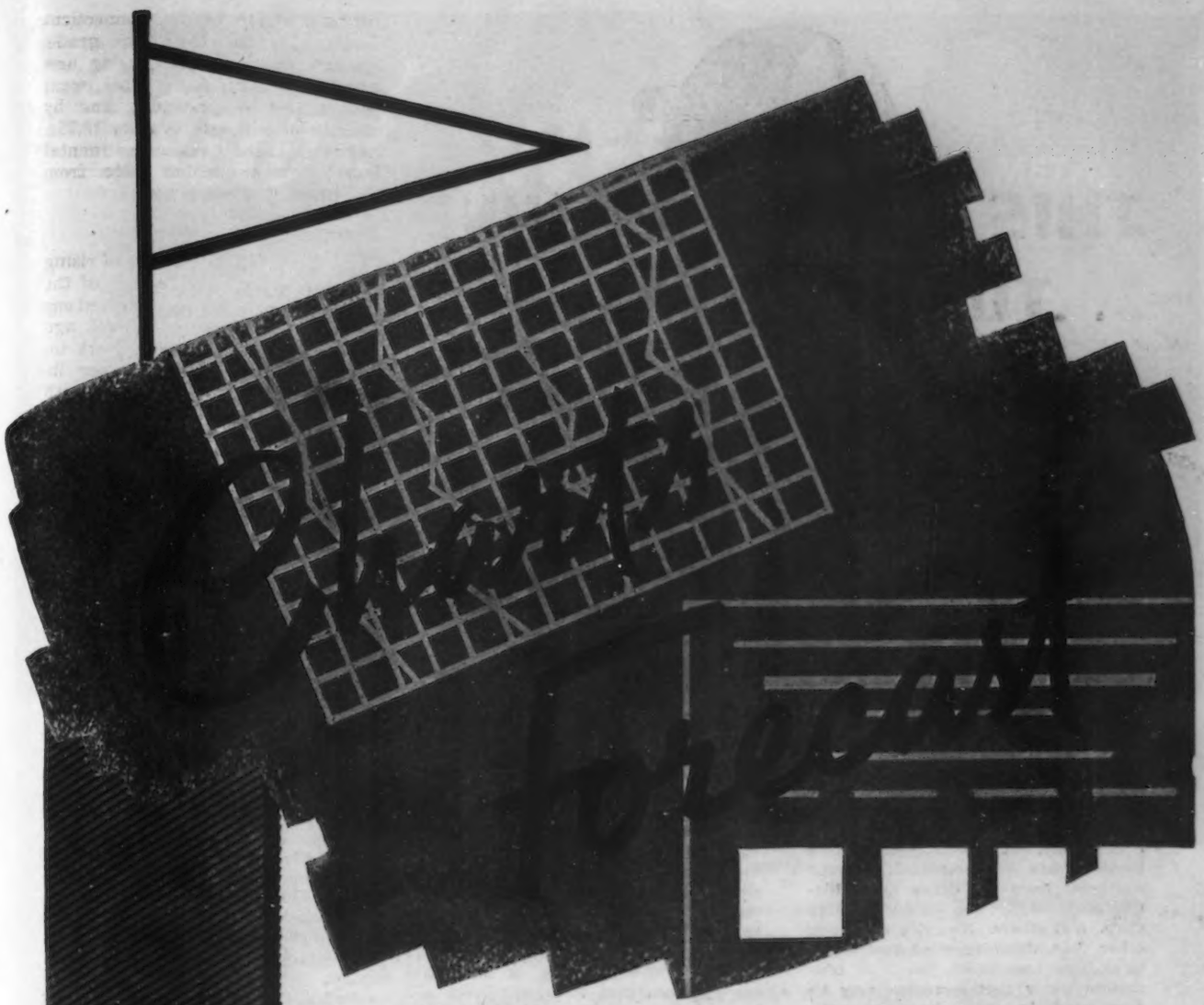
Brisk buying in the face of rising prices was the chief feature of the week's market. Prices advanced one cent from the level of a week ago and Straits metal in New York today is quoted at 59.75c. per lb. Buying is of a general nature, with dealers and consumers both very active. On Friday the International Tin Control Committee reestablished 110 per cent as the export quota for the fourth quarter. This action will have no effect on the market as the countries participating in this control scheme have been persistently underproducing. The extent of this under quota tonnage is set at 31,980 tons by the International Tin Research and Development Council. Heavy buying in London moved quotations up to £264 for cash standards, and £263 10s for three months' delivery.

Lead

New business has been slightly in excess of that done in the preceding week, but as October requirements are but half covered, sellers are attributing the delay in seeking coverage to the psychological effect of the declining securities prices. The week's bookings were well distributed throughout the consuming field at the strong and unmoved quotation of 6.50c. per lb., New York. A slackening in demand for export metal brought a decline in prices from 4.94c. to 4.74c. per lb., London, today.

Zinc

Sales have been light and buyers are apparently following the movements of the stock market closely as fluctuations in the market are daily reflected in spelter sales. Prime Western sales for the week, unavailable at the time of going to press, were estimated to have dropped substantially below the 7094-ton level of last week. As deliveries have remained constant, there will be a reduction shown in the volume of undelivered contracts. The position of the metal is still very strong and a breathing spell will undoubtedly be appreciated by sellers in view of the intense activity all summer and the unwieldy backlogs to be disposed of. Ore shipments for the week dropped to 8824 tons from 10,270 tons the preceding week. Production remained constant and stocks increased 1425 tons to 20,955 tons.



BETTER FILING IN YOUR PLANT

Here are charts that definitely and certainly predict better filing in your plant . . . for they are accurate charts of the ability of the new Nicholson, Black Diamond and McCaffrey Files to do better work, remove more stock and lower file costs.

These charts record performance in rigid tests. They predict future performance just as accurately . . . for Nicholson, Black Diamond and McCaffrey Files are known the world over for *uniformly* high performance . . . what is done by dozens of our files in laboratory tests will be duplicated by thousands of dozens in industrial plants everywhere.

Mill supply and hardware wholesalers everywhere can supply you with Nicholson, Black Diamond and McCaffrey Files. Nicholson File Company, Providence, R. I., U. S. A.

MADE IN THESE BRANDS
NICHOLSON
BLACK◇DIAMOND
McCAFFREY

PATENTS PENDING

A FILE FOR EVERY PURPOSE

THIS WEEK'S MACHINE . . .TOOL ACTIVITIES. . .

. . . War news has not resulted in deferred commitments thus far.

o o o

. . . Inquiries are increasing in volume, and orders continue at a good level.

o o o

. . . A number of American companies will expand facilities in Canada.

Chicago

INQUIRIES are gradually increasing in volume, but no outstanding future business has been reported. Buying continues from the Crane Co., Allis-Chalmers Mfg. Co., Electro-Motive Corp., and others. No price advances, other than those reported last week, have been announced, but it is considered likely that increases may be seen soon in other lines as well. Sellers here are generally optimistic over fall sales prospects.

Cincinnati

WHILE here and there some war scare comment is heard in the district market, the machinery demand the past week was about on a parity with the preceding period. Foreign demand and inquiry have broadened. Automotive ordering for crankshaft equipment brings hopes of early ordering from this source. Some decline in boring mill and planer demand has been noticed, but this is believed to be a minor fluctuation and not the beginning of a trend.

Factories, especially those making lighter tools, are operating at near capacity with little prospect of change until late in the next quarter. Labor conditions are quiet, although an occasional report of need for more skilled men is heard.

Detroit

CANADIAN expansion and further decentralization by automobile firms provide the clue to inquiries which are now out or coming. Nearly $750,000 will be spent before Nov. 15 in modernizing the Regina, Sask., plant of General Motors Corp. Closed since 1930, this five-building unit will be retooled to produce a maximum of 125 cars a day. Bodies will be built complete, and paint, welding and trim shops will be provided. The No-Sag Spring Co. has leased a plant in Windsor, Ont., and expects to have it equipped within a month for production. As time goes on, it becomes more certain that Ford will erect a huge press plant, probably to build bodies. It is also reported that Ford is planning a new assembly plant in Missouri and that Dodge will build a new factory at Tonawanda, near Buffalo. Fruehauf Trailer Co., Detroit, is equipping a new building as press shop, machine shop and paint shop. Final inspection work will be handled there, also, and a loading dock with two overhead cranes is being provided. A foundry addition is to be installed by the Sealed Power Corp. at Muskegon, Mich.

Cleveland

THE volume of machine tool sales so far this month shows little change from the latter part of August. Business has declined with one or two manufacturers who evidently were doing better than the average last month. Some dealers report a fair volume of sales and others very little activity. Dealers' business is confined to medium and small machines, with lathes, and milling machines predominating. There is considerable inquiry for good used and rebuilt machines, this demand being stimulated by extended deliveries of new tools. In the railroad field, the Chesapeake & Ohio continues to place small orders. Foreign inquiry continues active. A Cleveland manufacturer of turret lathes has closed a Russian order for 15 or 20 machines.

Some of the large industrial companies have already asked their production departments to make lists of machines needed through 1938 in order to make up their budgets.

Presses continue in good demand. The outstanding activity in this field during the week was the purchase of about 400 presses, mostly in small sizes, by the Ternstedt Mfg. Div. of General Motors Corp., Detroit, for equipping the plant that it is building near Trenton, N. J., for the manufacture of automobile hardware.

New York

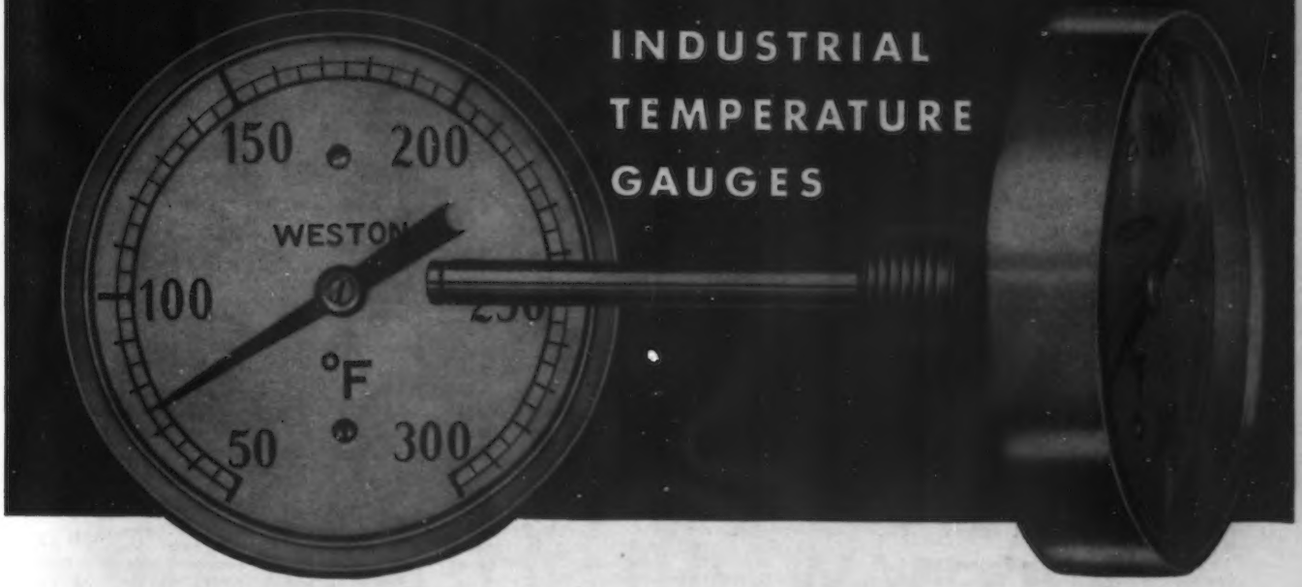
ALTHOUGH some dealers report business rather quiet compared with earlier in the summer, the majority are enjoying a substantial volume of sales. While no large buying programs are under way, there is a demand from miscellaneous sources that is encouraging. Considering orders placed to date and quotations outstanding, the September volume should be above that of August, which was the low point of the year, though much above expectations for the season. So far there has been no noticeable reaction from adverse world political news, or from the weakened stock market, the actions of which often influence executive decisions in this area perhaps more than in any other part of the country. The delivery situation shows practically no change, but it is significant to note that a number of machine tool builders were among the purchasers of equipment last week. The Pratt & Whitney Division of Niles-Bement-Pond Co., Hartford, Conn., will go on a 55-hr. week schedule beginning Oct. 1. Deliveries on certain models extending into next year necessitate the increase from the present 50-hr. week, which itself is above normal.

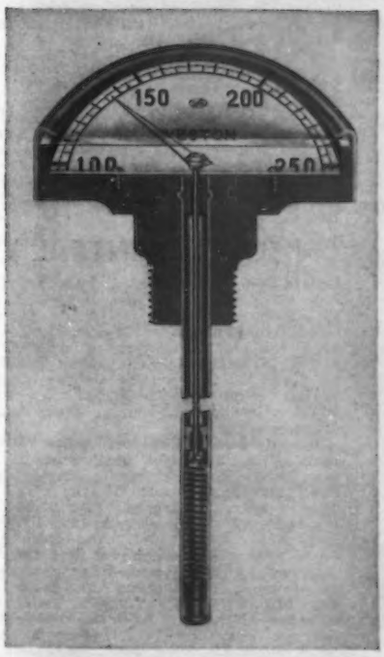
Pittsburgh

MACHINE tool inquiries have shown a slight pick-up in this district since Labor Day but are still well below the volume attained in the peak months earlier this year. Opinion concerning the fall outlook is mixed, some sellers holding that buying will be dull during the remainder of this year and others believing that a relatively good amount of activity may be expected. In general, order backlogs have declined, facilitating deliveries, but some producers still have large bookings to work off.

Whitehead Metal Products Co. of New York, Inc., a subsidiary of International Nickel Co., Inc., has announced plans to erect a new warehouse and assembly plant at Vernon, Cal. The company manufactures metal household products, including monel cabinet sinks and hot water heating units, and the new plant, which will provide over 50,000 sq. ft. of floor space, will be used to store and assemble the products made at its Cambridge, Mass., plant.

New! WESTON (ALL METAL) INDUSTRIAL TEMPERATURE GAUGES





Sectional view showing operating parts of WESTON *Industrial Temperature Gauge*

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Operating on a new but thoroughly proved principle which provides sustained accuracy and easy readability, and which eliminates breakage from over-temperatures, the new WESTON industrial temperature gauges are finding wide application throughout all industry for the usual as well as many unusual temperature indicating requirements. Complete information is available. Communicate with the nearest WESTON representative, or, send coupon for literature.

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PLANT EXPANSION AND EQUIPMENT BUYING

NORTH ATLANTIC

Bureau of Yards and Docks, Navy Department, Washington, has appropriation of $285,000 for extensions and improvements at Brooklyn Navy Yard, for which plans will be completed soon, including new one-story pickling plant, cost $60,000 with equipment; three one-story welding sheds, $25,000; improving and extending shipways, $155,000; and improving, rearranging and extending electric and compressed air lines at shipways, $45,000. Appropriation of $250,000 has been authorized for expansion at Philadelphia Navy Yard, including three one-story welding sheds, $25,000; new pickling tank, $20,000; five 10-ton traveling cranes for pier 4, cost about $100,000; one 50-ton armor plate crane, $35,000; one 35-ton, long boom locomotive crane, $20,000; and new cofferdam at end of shipways, $50,000.

Pan-American Airways System, 135 East Forty-second Street, New York, has plans for hangar, 110 x 210 ft., with repair and reconditioning facilities, at Miami, Fla., airport. Cost over $80,000 with equipment. L. B. Taylor, Congress Building, Miami, is consulting engineer. Fred J. Gelhaus, Aviation Building, Coconut Grove, Fla., is company construction engineer.

O. Z. Electrical Mfg. Co., Inc., 45 Bergen Street, Brooklyn, has purchased two-story factory at 262-66 Bond Street for new plant.

Standard Brands, Inc., 595 Madison Avenue, New York, manufacturer of canned and other food products, has let general contract to Patrick W. Mulderry, 5 St. Joseph's Terrace, Albany, N. Y., for one-story factory branch, storage and distributing plant at Albany. Cost close to $50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 21 for one 30-in. pattern-makers' gap lathe (Schedule 1609), one 5-in. comparator and optical-measuring machine, pedestal type, with hood (Schedule 1602); until Sept. 24, 13 steel camshafts (Schedule 1596) for Brooklyn Navy Yard; one ½-hp. electric bench grinder (Schedule 1326) for New York, Philadelphia or Norfolk yards.

Harris Hardware & Mfg. Co., Inc., New York, care of William H. Wright, 347 Madison Avenue, architect, has filed plans for a six-story plant, 25 x 150 ft., at 99 Chambers Street. Cost about $100,000.

Air Reduction Sales Co., 60 East Forty-second Street, New York, has let general contract to T. Jarvis Co., Railway Exchange Building, St. Louis, for addition to factory branch, storage and distributing plant at St. Louis, and improvements in present building. Cost over $40,000 with equipment.

Whitney Blake Co., 17 East Forty-second Street, New York, manufacturer of insulated wire and cable, has arranged for stock issue to total about $250,000, part of proceeds to be used for plant extensions and additional equipment.

Jewel Incandescent Lamp Co., 900 Passaic Avenue, East Newark, N. J., manufacturer of electric lamps and allied electrical products, has purchased former plant of Townsend Lawn Mower Co., Bloomfield, N. J., consisting of a three-story building, 83,000 sq. ft. floor space, for new plant, using entire building as soon as vacated by United States Department of Agriculture, present tenant. East Newark works will be removed to new location and increased capacity carried out.

Petitt Paint Co., 45 Cornelison Avenue, Jersey City, N. J., has let general contract to Thomas Greco, 83 Carmer Avenue, Belleville, N. J., for new two-story plant. Cost over $45,000 with equipment.

Supply Officer, Naval Aircraft Factory, Navy Yard, Philadelphia, asks bids until Sept. 21 for precision-type bearings for aircraft (Aero Req. 516).

Philadelphia Electric & Mfg. Co., 1236 North Thirty-first Street, Philadelphia, has purchased two-story adjoining building, on site 120 x 158 ft., for expansion.

United Steel Barrel Co., Swanson and Mifflin Streets, Philadelphia, has taken title to two one-story buildings at Mifflin and Water Streets, with adjoining vacant property, for plant.

BUFFALO DISTRICT

General Abrasive Co., College Avenue, Niagara Falls, N. Y., has filed plans for one-story machine shop, 44 x 104 ft.

Eastman Kodak Co., Kodak Park, Rochester, N. Y., has let general contract to Ridge Construction Co., Kodak Park, for addition to factory 201, used in connection with film manufacture. Cost over $75,000 with equipment.

NEW ENGLAND

Fremont Casting Co., 105 Fremont Street, Worcester, Mass., manufacturer of gray iron castings, has let general contract to Fiske-Carter Construction Co., 8 Norwich Street, for one-story foundry addition, 40 x 110 ft. Cost close to $30,000 with equipment.

Bridgeport Metal Goods Mfg. Co., Cherry Street, Bridgeport, Conn., manufacturer of brass, aluminum, steel and other metal products, has let general contract to Gellatly Construction Co., 25 Housatonic Avenue, for one-story addition, 75 x 100 ft. Cost close to $50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 21 for steel castings (Schedule 1569); until Sept. 28 for alloy steel forgings (Schedule 1616) for Newport, R. I., Navy Yard.

Rogers & Hubbard Co., Middletown, Conn., manufacturer of commercial fertilizer, plans rebuilding part of plant at Portland, Conn., recently destroyed by fire. Loss close to $125,000 with equipment.

F. W. Sickles Co., Springfield, Mass., manufacturer of radio equipment and parts, has leased part of plant of Barney & Berry Co., about 15,000 sq. ft. of floor space, for expansion, providing facilities for about 100 additional employees.

Raybestos-Manhattan Co., Bostwick Avenue, Bridgeport, Conn., manufacturer of brake lining, clutch facings, etc., has let general contract to Otto F. Burghart, 333 North Avenue, for one-story addition to plant at Stratford, Conn., 22 x 121 ft. Cost over $45,000 with equipment. H. E. Koerner, Bridgeport, is architect.

WASHINGTON DIST.

Chemical Warfare Service, Edgewood Arsenal, Edgewood, Md., asks bids until Sept. 20 for 155 motor-driven blower units (Circular 73); until Sept. 30, one gasoline engine-driven electric generator set (Circular 60).

Pan-American Airways System, 135 East Forty-second Street, New York, will take bids soon for superstructure for hangar, 180 x 260 ft., with repair and reconditioning facilities, at new municipal airport, Baltimore. Cost over $200,000 with equipment. W. W. Pagon, Lexington Building, Baltimore, is consulting engineer.

General Purchasing Officer, Panama Canal, Washington, asks bids until Sept. 23 for one power-driven floor-sanding machine, six 15-ton screw jacks, one 1½-ton gasoline motor truck with garbage dump-type body and hydraulic hoists, 1½-ton gasoline motor trucks, dump-type body with underbody hydraulic hoists, one gasoline motor truck, with extra large all-steel panel delivery-type body, eight 6000-lb. four-wheel steer trailers, for use with electric trucks or tractors, one gasoline engine-driven industrial tractor with cab, and other equipment (Schedule 3287).

Inter-Coastal Paint Co., 2320 Edgewater Street, Baltimore, manufacturer of paints, varnishes, oils, etc., has plans for rebuilding one and two-story plant recently destroyed by fire. Cost close to $45,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 21 for six arc welders' machines (Schedule 1628); until Sept. 24, nickel-copper alloy air cylinder forgings (Schedule 1606), recoil cylinder, centrifugal cast, bearing bronze liners (Schedule 1605) for Washington Navy Yard; 368 railroad rails, 52,900 lb. angle splice bars, 3500 oval-neck buttonhead track bolts, 17,000 lb. steel track spikes, 19 gross tons shoulder tie plates, two sets plit switches, two frogs, four sets angle splice bars (Schedule 1584), one motor-driven lathe, milling machine and equipment (Schedule 1623) for White Plains yard; 100,000 lb. medium steel rivets, ¾-in. dia., bars 16 to 20-in. long (Schedule 1591) for Eastern or Western navy yard.

SOUTH ATLANTIC

Smith & Ladson Guano Co., Moultrie, Ga., manufacturer of commercial fertilizer, has let general contract to Pipping Construction Co., Moultrie, for one-story plant, 120 x 175 ft. Cost about $45,000 with machinery.

United States Engineer Office, Charleston, S. C., asks bids until Sept. 21 for two 3-ft. 4-in. diameter safety wheels made of 1¼-in. steel rod, eight spokes of ¾-in. diameter steel rod, and hub cut from 5-in. carbon steel shafting; five wheels, similar size, with rims made from 1⅛-in. steel rod, six spokes of ⅝-in. steel rod and hub cut from 5-in. carbon steel shafting (Circular 10).

Schaaf Preserving Co., 3034 N. W. Seventeenth Avenue, Miami, food packer and canner, has let general contract to Riley Builders, Inc., 843 N.W. Third Street, for one and two-story fruit processing and canning plant. Cost close to $40,000 with equipment. B. Kingston Hall, 1447 Collins Avenue, Miami Beach, Fla., is architect.

SOUTH CENTRAL

Coca-Cola Bottling Co., Paducah, Ky., has let general contract to John Cole Co., Paducah, for new two-story mechanical-bottling plant at Madisonville, Ky., 47 x 121 ft., with wing extension, 45 x 47 ft., and one-story adjoining building, 27 x 152 ft., for storage, distribution and loading. Cost close to $70,000 with equipment. Casner & Fleming, Madisonville, are architects.

United States Engineer Office, Vicksburg, Miss., asks bids until Sept. 21 for two 20,000 lb. double-track, single beam, hand traveling cranes, 14 ft. 8 in. between center of tracks; two 20,000 lb. low-head geared trolley hoists, lift not less than 14 ft., and hand-chain drop from bottom of I-beam not less than 14 ft.; two 20,000 lb. geared trolleys, hand-chain drop from bottom of I-beam not less than 19 ft.; two 20,000 lb. high-speed, spur-geared hoists, hoist to have total lift not less than 14 ft. (Circular 42); until Sept. 22 three 24-in. motor-driven, vertical propeller-type pumping units (Circular 43).

Dixie Culvert & Pipe Co., 339 West Olive Street, Memphis, Tenn., has plans for new works in Fairfields district, Baton Rouge, La., including storage and distributing buildings. Cost close to $60,000 with equipment.

SOUTHWEST

State Board of Administration, State Capitol Building, Topeka, Kan., J. A. Mermis, business manager, plans extensions and improvements in power plant at University of Kansas Hospital, Thirty-ninth Street and Rainbow Boulevard, Kansas City, Kan., including additional equipment. Fund of $68,000 has been arranged through Federal aid. Raymond A. Coolidge, first noted address, is State architect.

City Council, St. Francis, Kan., plans extensions and improvements in munici-

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pal electric power plant, including two new diesel engine-generator units and auxiliary equipment. Cost about $90,000. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Porter Oil Co., Joaquin, Tex., is considering new natural gasoline plant. Cost over $60,000 with compressors, control equipment, steel tanks and other equipment.

Richters Bakery, 430 South Laredo Street, San Antonio, Tex., will ask bids soon on one-story baking plant at Corpus Christi, Tex. Cost about $100,000 with traveling ovens, conveyors, loaders and other mechanical equipment. Charles T. Boelhauwe, 512 North Cherry Street, San Antonio, is architect.

Missouri Pacific Railroad Co., San Antonio, Tex., plans rebuilding part of local car repair shops recently destroyed by fire. Loss close to $30,000 with equipment.

WESTERN PA. DIST.

Anchor Drawn Steel Co., East Latrobe, Pa., has plans for one-story addition, 60 x 85 ft. Cost close to $40,000 with equipment.

City Controller, City-County Building, Pittsburgh, asks bids until Sept. 27 for one or more municipal incinerator plants, divided into two operating units, 600 and 300-ton capacity, respectively. Specifications at office of Department of Public Health, address noted. (Estimated cost of 600-ton unit is $600,000 and 300-ton unit, $300,000.)

Hamburger Distillery, Inc., Oliver Building, Pittsburgh, plans multi-story addition to distilling plant, primarily for storage and distribution. Company is arranging for sale of 40,000 shares of preferred stock and 10,000 shares of common stock, part of proceeds to be used for purpose noted.

MICHIGAN DISTRICT

Leonard Refineries, Inc., Alma, Mich., plans addition to oil refinery, primarily for blending division. Cost close to $50,000 with equipment.

Briggs Mfg. Co., 11631 Mack Avenue, Detroit, steel automobile bodies, has let general contract to F. H. Martin Construction Co., 955 East Jefferson Street, for addition to power house. Cost over $80,000 with equipment.

De Soto Motor Corp., 6000 Wyoming Avenue, Detroit, has approved plans for expansion, including one-story top addition to present two-story assembling building, extensions in final assembling lines, additional equipment in press shops and other work. About 100,000 sq. ft. of new floor area will be provided. Cost over $650,000 with equipment. Company is a division of Chrysler Corp.

City Council, Mount Pleasant, Mich., plans new municipal electric power plant and distributing system. Cost about $538,000. Financing is being arranged through Federal aid.

Brass Forgings, Inc., 693 Congress Street, Detroit, is building a new plant 50 x 150 ft., at Ferndale, Mich., to cost $22,000, exclusive of equipment.

OHIO AND INDIANA

General Spring Co., 125 East McMicken Street, Cincinnati, manufacturer of coiled wire and other steel springs, will soon take bids on revised plans on general contract for one-story plant unit, 85 x 165 ft., at Herald and Pacific Avenues. Cost close to $70,000 with equipment. Carlton, Frankenberger & Batson, 4122 Davis Lane, are Architects and engineers.

Variety Machine & Stamping Co., 12695 Elmwood Avenue, Cleveland, manufacturer of metal stampings, has acquired about one acre adjoining factory and plans early erection of one-story addition, primarily for a heat-treating unit. Cost over $45,000 with equipment.

Hoban Brass & Foundry Co., 44 Wyandot Street, Dayton, Ohio, manufacturer of brass, bronze and other metal castings, has let general contract to Henry Stock & Son, 26 North Ludlow Street, for one-story foundry addition, 70 x 140 ft. Cost about $40,000 with equipment. Frank J. Weis, 45 Burns Avenue, is architect.

Contracting Officer, Material Division, Army Air Corps, Wright Field, Dayton, Ohio, asks bids until Sept. 20 for 30,000 ignition cable markers (Circular 148), rim light adapter assemblies, air speed indicators, altimeters, bank and turn indicators, fuel pressure gages, oil pressure gages, manifold pressure gages, thermocouple indicators, de-icer pressure gages and tachometers (Circular 146); until Sept. 21, two turret punches with 12 round punches and dies ranging from ⅛ to 1-in., hand-operated, bench type, capacity ordinary machine steel 1-in. hole in ⅛-in. stock (Circular 172), 874 solderless elbows, 874 solderless nipples, 1750 solderless nuts, 3000 solderless sleeves, 874 solderless tees and 874 solderless unions (Circular 180); until Sept. 22, one jig borer, 16 x 30 in. table-working surface, 24 in. longitudinal travel, motor-driven, and 4-in. centering machine, motor-driven (Circular 159).

City Council, Richmond, Ind., plans extensions and improvements in municipal electric power plant, including new boiler unit and other equipment. Cost about $440,000. Work will be carried out early in 1938.

MIDDLE WEST

Sherman-Klove Co., 3531 West Forty-seventh Street, Chicago, manufacturer of screw machines, mechanics, hand tools, sheet metal specialties, etc., has plans for one-story addition, about 54,000 sq. ft. of floor space, for which bids will be asked soon on general contract. Company will occupy about one-half of new space for expansion, remaining part to be used by Brazil Stamping Co., 5151 West Sixty-fifth Street, a subsidiary, manufacturer of stamped metal products, which will be removed to new location. Cost about $200,000 with equipment. A. Epstein, 2001 West Pershing Road, is architect and engineer.

United States Engineer Office, Rock Island, Ill., asks bids until Sept. 24 for four gasoline engine-operated, full revolving, locomotive-type cranes (Circular 54).

Pullman-Standard Car Mfg. Co., 79 East Adams Street, Chicago, has plans for one-story addition to plant at Michigan City, Ind., for production of spot-welded steel freight cars on straight-line production basis. Cost over $500,000 with equipment. United Engineers & Constructors, Inc., 1401 Arch Street, Philadelphia, is engineer.

City Council, Alliance, Neb., will take bids soon for new municipal electric light and power plant, including turbo-generator unit, high-pressure boiler and auxiliary equipment. Bond issue of $242,000 has been authorized for project.

Quartermaster, Fort Crook, Neb., asks bids until Oct. 4 for one steel boiler, three 34,000 b.t.u. unit heaters, one 38,200 and one 28,000 b.t.u. unit heaters, and one automatic stoker (Proposal 221-8).

Asher Motors, Inc., Main and South Railway Streets, Spencer, Iowa, has plans for one-story addition, 50 x 100 ft., for repair shop, and for storage and distribution.

Bureau of Reclamation, Denver, asks bids until Oct. 1 for three motor-driven gate hoists for operating 25 ft. 8 in. x 40 ft. fixed wheel gates in spillway at Alcova Dam, Kendrick Project, Wyo. (Specifications 754).

Allis-Chalmers Mfg. Co., Milwaukee, has placed general contract with Sidney M. Siesel Co., 514 East Ogden Avenue, for tractor shop extension, 210 x 600 ft.; gear shop, 210 x 250 ft., two stories and part basement, and heat treating plant, 100 x 130 ft., at main works in West Allis. Cost about $2,600,000. Carl E. Meyer is company architect and engineer. General contract also has been placed with Lovering & Longbotham, St. Paul, Minn., for assembly shop-boiler plant, 80 x 360 ft., one-story, and general storage and material handling building, 150 x 300 ft., three stories and basement, at farm and tractor implement works, La Crosse, Wis. Cost with equipment will be approximately $1,000,000. Fred J. Papenfuss is works manager at La Crosse.

Air Reduction Sales Co., 818 West Winnebago Street, Milwaukee, has plans for enlargement of plant of subsidiary, Pure Carbonic Co., in West Allis, at cost of $15,000 for structure and $50,000 to $75,000 for equipment. Samuel H. Smith is manager at Milwaukee.

City Council, Bessemer, Mich., has received approval of PWA loan and grant of $187,500 for proposed new municipal electric generating plant, equipment to include two 320-kw. diesel engine driven generators, with two 15,000-gal. steel oil storage tanks. Leo F. Miller is city clerk.

Ampco Metals, Inc., 3830 West Burnham Street, Milwaukee, manufacturer of bronze alloy castings and products, has placed general contract with William Keierleber & Co., 5006 West Burleigh Street, for foundry addition, 80 x 200 ft., to cost about $75,000 or more with equipment.

PACIFIC COAST

Consolidated Chemical Industries, Inc., 111 Sutter Street, San Francisco, manufacturer of industrial chemicals, has let general contract to Barrett & Hilp, 918 Harrison Street, for one-story addition to plant on Bayshore Boulevard, 80 x 200 ft., primarily for storage and distribution. Cost close to $75,000 with equipment. J. Francis Ward, 68 Post Street, is architect; W. H. Ellison, 821 Market Street, is consulting engineer.

Bureau of Yards and Docks, Navy Department, Washington, has secured appropriation of $275,000 for one-story shop unit at Mare Island Navy Yard, 100 x 400 ft., in part for oil and paint storage and distribution. It will replace a smaller unit destroyed by fire last May.

Willard Storage Battery Co. of California, Inc., 5700 East Ninth Street, Los Angeles, has let general contract to William Simpson Construction Co., 816 West Fifth Street, for one-story addition, 75 x 100 ft. Cost close to $50,000 with equipment. Claud Beelman, Union Bank Building, is architect. Main offices are at Cleveland.

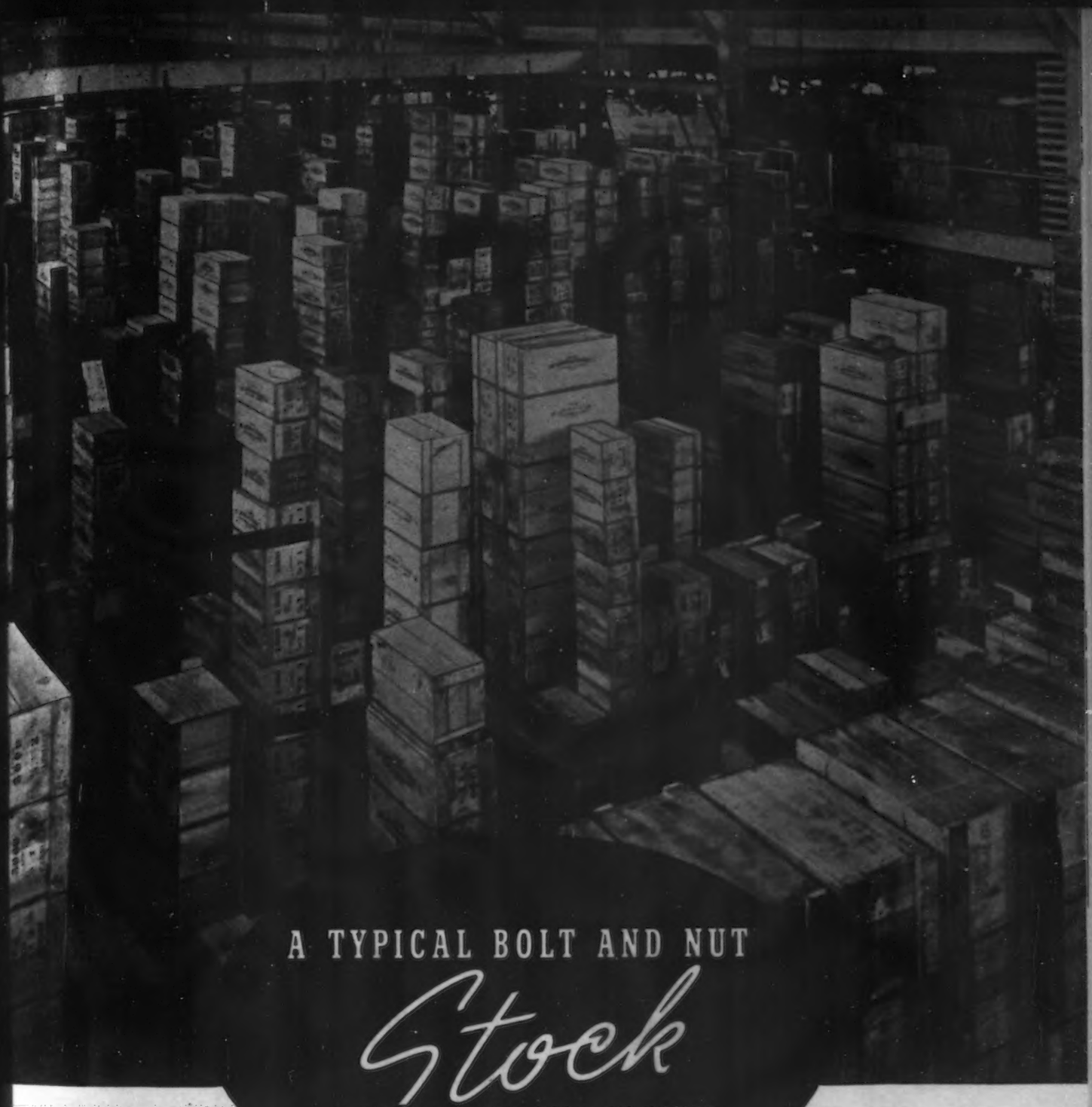
California Cotton Oil Corp., Coachella, Cal., plans rebuilding part of plant recently destroyed by fire. Loss about $50,000 with equipment.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Sept. 21 for three one-ton compressor units, with compressor, condenser, electric motor, valves, fittings, safety devices, etc. (Schedule 1581) for San Diego Naval Air Station; one gasoline engine-driven, self-propelled crane (Schedule 1577); until Sept. 24, 10 steam-jacketed kettles, each 80-gal. capacity, aluminum or corrosion-resisting steel (Schedule 1594) for Mare Island Navy Yard; until Sept. 28, wire rope (Schedule 1608) for San Pedro, Cal., station.

American Laundry Machinery Co., 566 First Avenue South, Seattle, with main plant at Norwood, Cincinnati, has let general contract to Henrikson-Alstrom Construction Co., Textile Tower Building, for one-story storage and distributing plant, 90 x 90 ft. Cost abut $35,000 with oquipment. Graham & Painter, Dexter-Horton Building, are architects.

Mexico to Purchase Bridges and Rails

MEXICO is contemplating the purchase of approximately 35 steel bridges ranging from 65-ft. to 1400-ft. in length and an additional number of smaller bridges ranging from 10-ft. to 60-ft., the total of such requirements aggregating about 13,000 metric tons, according to a report to the Metals and Minerals Division, Department of Commerce, by American Commercial Attache Thomas H. Lockett, Mexico City. In addition to the bridges, it is reported that the construction program will require the annual purchase of approximately 20,000 metric tons of 70, 80, and 90 lb. rails. American firms and individuals interested in this potential market should address their communications to Sr. Ulises Irigoyen, Director General de Ferrocarriles, de Trafico y de Tarifas, Sria. de Communicaciones y Obras Publicas, Plaza de la Reforma No. 2, Mexico, D. F.



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- Excellent for building up wear resisting surfaces. Welds have good tensile strength, maximum ductility and are non-porous.
- Weld deposits are easily machined.
- Will withstand reheating without harmful effect—Free flowing—Fine tinning qualities.
- Fumeless, adding greatly to comfort of operator.

Use this ideal rod on your next job requiring the building up of piston heads, bull rings or the welding of cracked cylinders or on any one of many other operations. For more detailed information write to the nearest AIRCO office.

AIR REDUCTION SALES COMPANY

General Offices, 60 E. 42nd St., New York, N. Y.

A NATION-WIDE WELDING and CUTTING SUPPLY SERVICE

● The completeness of the DeVilbiss Spray-Finishing System is well illustrated by the extensive line of standard DeVilbiss Spray Guns.

The DeVilbiss New Type MBC Spray Gun is, of course, the accepted gun for most all common production finishing operations and materials.

But some operations and materials require spray-gun performance not common to general production finishing, while others do not require the superlative performance of such an advanced gun as the all-purpose Type MBC. And for practically every one of these exceptions to the general rule, there is a gun within the standard DeVilbiss line that will fill the needs of the work to be done.

And further, should any material or operation prove so exceptional that requirements cannot be met by one of the standard guns, DeVilbiss is prepared to meet this problem with a specially designed gun.

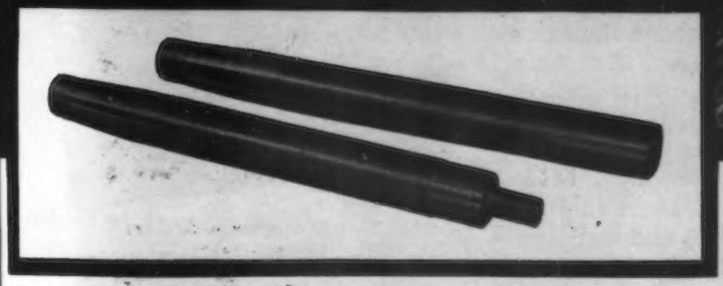
This completeness of equipment is carried out not only in spray guns, but throughout the entire DeVilbiss Spray-Finishing System. Whatever your own finishing problem, DeVilbiss is equipped to provide an installation exactly suited to your individual requirements.

The DeVilbiss Company, Toledo, Ohio

DeVilbiss

SPRAY GUNS · REGULATORS · SPRAY BOOTHS · EXHAUST FANS · AIR COMPRESSORS
MATERIAL CONTAINERS · HOSE AND CONNECTIONS · ACCESSORIES

Shafts Turned AT A SAVING OF 39%



These shafts are machined in two operations: First consists of turning, threading, turning a taper on one end and cutting off to the correct length. The second includes turning back a shoulder and turning down and threading for a ⅝ inch nut. Material is cold rolled steel SAE 1112 bar stock.

GISHOLT TURRET LATHES

Sizes from 1″ to 12″ bar capacity—up to 34″ chucking capacity

● What a competitive advantage you'd have if you could cut your entire manufacturing costs nearly 40%! On jobs like this, the Gisholt is doing it. Here's a manufacturer who produces 32,000 shafts per year, similar to these. Machining cost on this quantity formerly amounted to $1328. Now it is reduced to only $808 with this new Gisholt No. 4 Ram Type Universal Turret Lathe arranged with bar feed—a saving of 39%.

Now is the time to take advantage of the new improvements which save time and cut costs. Why not get full information about these new Gisholts?

Only Gisholt Turret Lathes offer you ALL these cost-saving features:

★ Easier, faster operation, with simple controls and less effort.

★ Heavy, rigid construction permits the use of faster cutting tools and higher cutting speeds with multiple cuts, together with greater precision and accuracy.

★ Selective gear transmission with double multiple disc clutches saves time by direct shifting back and forth, between high and low speeds, as from turning to threading in this case.

★ Automatic spindle brake stops the spindle quickly without loss of time for changing pieces in the chuck.

★ Automatic indexing and clamping of the hexagon turret saves time in carrying through a cycle of operations.

★ Feed changes are easily and quickly made. Direct reading dials on all feed change levers on the aprons.

★ The cross slide is made long enough to permit the tool post to be positioned at the side of the collet chuck guard, out of the operator's way when not needed.

★ All headstock gears are hardened steel with ground teeth for quiet, smooth operation.

WRITE FOR YOUR COPY of the new Gisholt Catalog of Standard Tools for Nos. 3, 4 and 5 Ram Type Universal Turret Lathes. It will give you many new ideas on how you can shorten set-up and machining time.

GISHOLT

GISHOLT MACHINE COMPANY

1215 EAST WASHINGTON AVENUE, MADISON, WISCONSIN, U. S. A.

TURRET LATHES • AUTOMATIC LATHES • TOOL GRINDERS • BALANCING MACHINES

LIFE IS *getting tougher* FOR HERRINGBONE SPEED REDUCERS

—but Jones Reducers thrive on tough going!

EVERY year the conditions laid down for Herringbone reducers get tougher and tougher. Motor speeds are higher with proportionately larger ratios and smaller reducers are called for with heavier loading on the gears.

Fortunately the improvement and refinement of Jones Herringbone Speed Reducers have kept pace with the times until today there are greater values built into these reducers than would have been thought possible a few years ago.

With the accuracy and precision of Jones Herringbone Reducers goes sturdiness, compactness, symmetry and balance, and all of these mean maximum efficiency, long life and improved performance.

These reducers are built in a broad range of ratings and ratios in single, double and triple reduction types in capacities from as low as ½ H. P. to more than 400 H. P. . . . . and the Jones line covers an equally broad range of spur, gear and worm gear reducers.

The Jones organization will be pleased to work with you and to furnish detailed information on any type of drive or drive problem.

Here's the latest information about the application of Herringbone Reducers.

This new 96-page catalog of Jones Herringbone Reducers presents a vast amount of data relating to Herringbone Reduction Units. Illustrations show a broad range of applications and the technical information shows how to select reducers for all conditions of service in accordance with the A.G.M.A. recommended practice.

Write for your free copy of this valuable treatise.

W. A. JONES FOUNDRY & MACHINE COMPANY
4435 Roosevelt Road
Chicago, Illinois

Single Type Herringbone Reducer Driving Pug Mill and Extruder.

Double Type Herringbone Reducer Driving Stone Drier.

Double Type Herringbone Reducer Driving Forming Press.

Triple Type Herringbone Reducer Driving Normalizing Furnace.

Jones

Since 1890

HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS • CUT AND MOLDED TOOTH GEARS • V-BELT SHEAVES

ANTI-FRICTION PILLOW BLOCKS • PULLEYS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES

IDENTICAL—TWO OR TWO MILLION

• Month after month, year after year, Cleveland Cap Screws maintain a uniformity of accuracy and tensile strength that is [illegible] to our customers. Largely the result of our own development, the Kaufman [illegible] we are able to produce cap screws with Class 3 fit as standard, in any quantity, in any size, without noticeable deviation in the slightest particular. Specify these better cap screws for [illegible] assemblies.

THE CLEVELAND CAP SCREW COMPANY, 2930 E. 79th St., Cleveland, Ohio.

CLEVELAND CAP SCREWS

SET SCREWS • BOLTS AND NUTS

Address the Factory or our Nearest Warehouse: Chicago, 726 W. Washington Blvd. • Philadelphia, 12th & Olive Streets
New York, 47 Murray Street • Los Angeles, 1015 E. 16th Street

ZINC ALLOY DIE CASTINGS

—their place in the Major Industries
Automotive • Machinery • Household Appliance • Electrical
Radio • Hardware • Business Machine • Small Tool • Toy

COMPACT AND EFFICIENT

— this business machine has been "engineered" for sales

With the modern trend toward compactness in office appliances, design engineers are seeking manufacturing methods and materials of greater flexibility. Compactness means fewer parts—smaller, tougher parts—parts that must perform efficiently in a restricted area. The new rotary-type electric duplicating machine shown here incorporates 39 ZINC Alloy Die Castings, representing 58% of the total weight of the unit.

Because of the intricacies of design, the use of this metal and method offers dimensional accuracy, strength, reduction in the number of parts and assembly operations—a combination of advantages not possible with other dependable methods of construction. The exposed castings are easily finished with chromium plate or a handsome black enamel.

The business machine group is only one of many major industries in which ZINC Alloy Die Castings have been adopted through careful engineering research and cost analysis. If *you* are not thoroughly acquainted with these characteristics, we suggest you consult a commercial die caster—or write to this Company.

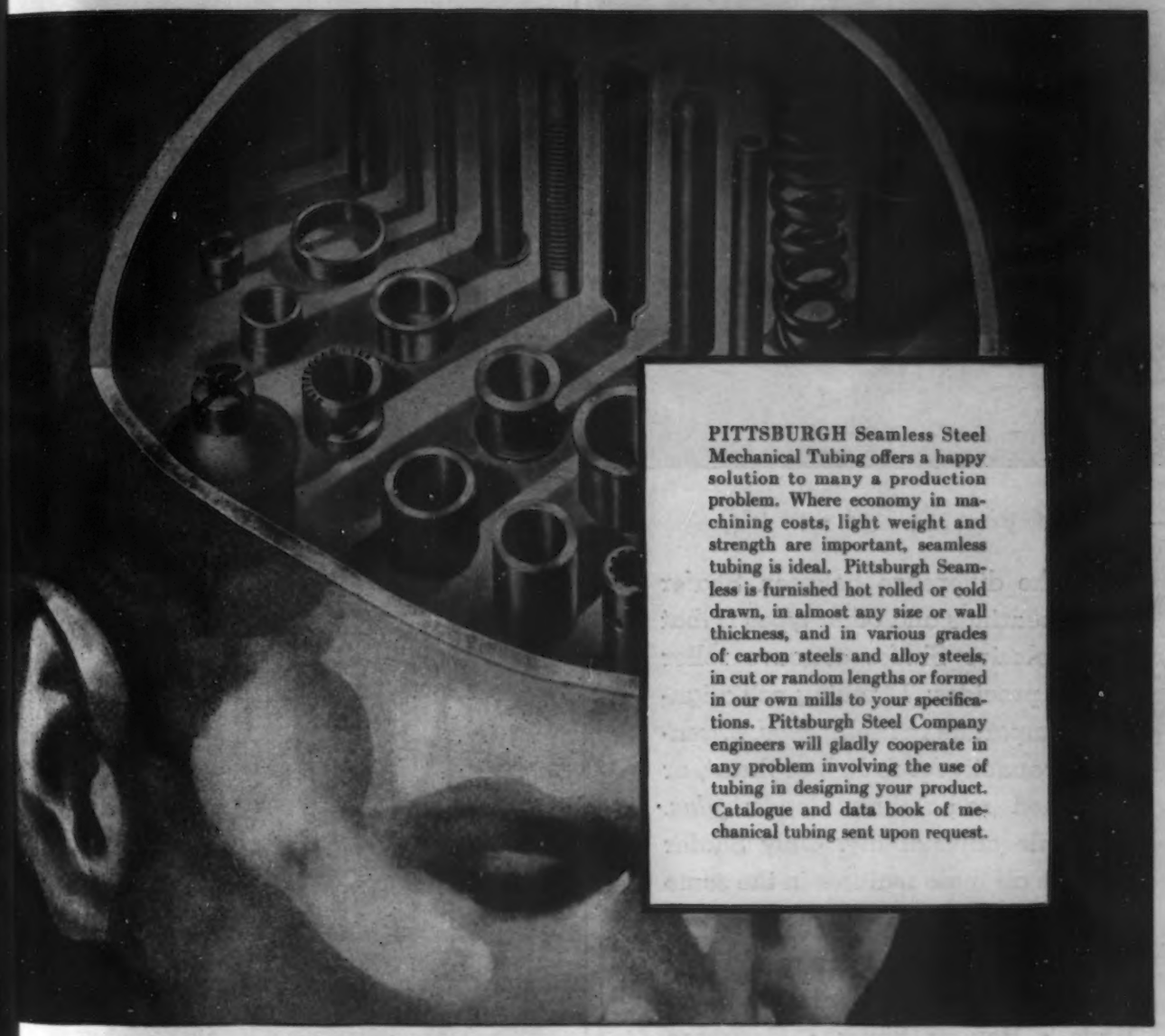
THE NEW JERSEY ZINC CO.
160 Front Street New York

The Research was done, the Alloys were developed, and most Die Castings are specified with

HORSE HEAD SPECIAL (99.99+% UNIFORM QUALITY) ZINC

Bear in mind . . .

PITTSBURGH SEAMLESS



PITTSBURGH Seamless Steel Mechanical Tubing offers a happy solution to many a production problem. Where economy in machining costs, light weight and strength are important, seamless tubing is ideal. Pittsburgh Seamless is furnished hot rolled or cold drawn, in almost any size or wall thickness, and in various grades of carbon steels and alloy steels, in cut or random lengths or formed in our own mills to your specifications. Pittsburgh Steel Company engineers will gladly cooperate in any problem involving the use of tubing in designing your product. Catalogue and data book of mechanical tubing sent upon request.

PITTSBURGH STEEL COMPANY · PITTSBURGH, PA.

New York Philadelphia Cleveland Detroit Chicago
Memphis Charlotte Tulsa Houston Los Angeles

Large stocks carried by distributors in the principal cities

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STEEL MECHANICAL TUBING

The difference between Shafer roller bearings and other types is that the exclusive Shafer concave roller design provides: 1. rolling self-alignment (important in itself); *plus*, 2. generous capacity for radial, or thrust, or combined radial-thrust loads; *plus*, 3. simple adjustability. Only Shafer delivers all these features in the same bearing.

Available in a full range of sizes: Pillow Blocks • Flange Units • Take-up Units • Hanger Boxes • Cartridge Units • Duplex Units • Conveyor Rolls • Radial-thrust Roller Bearings.

SHAFER BEARING CORPORATION

35 East Wacker Drive Chicago

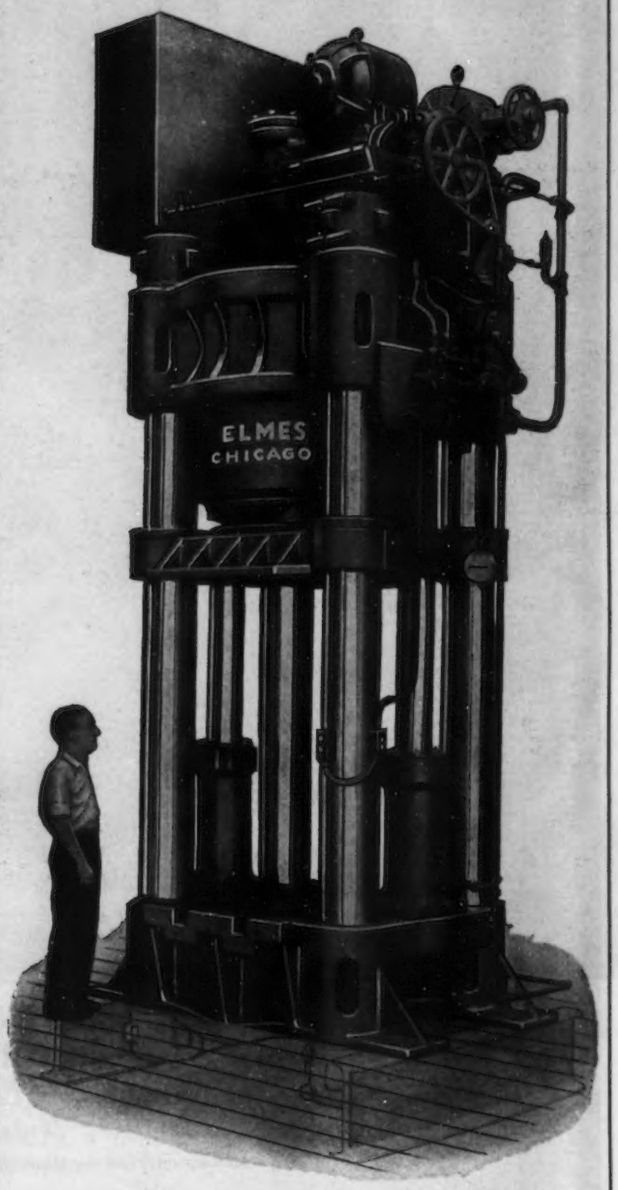
Everything You Need in a Roller Bearing

HYDRAULIC MACHINERY SINCE 1851

ELMES

CHICAGO

HEAVY DUTY HIGH SPEED HYDRAULIC FORMING PRESSES



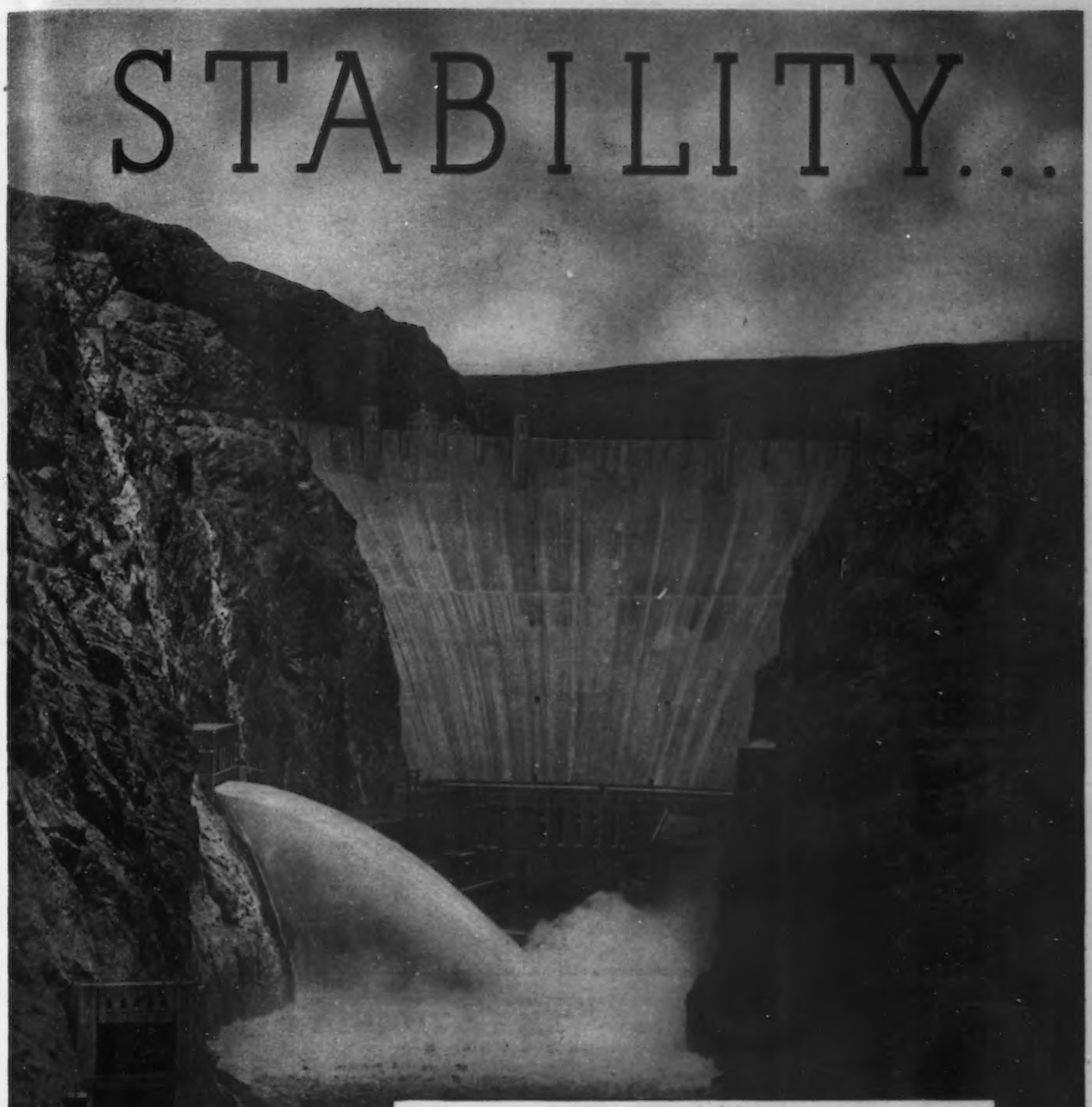
Rapid Advance and Return. Each Cycle Automatically Controlled and Timed.

CHARLES F. ELMES ENGINEERING WORKS

1003 Fulton St., Chicago, Ill., U.S.A.

Telephone HAYmarket 0696

STABILITY...



. . . AN ESSENTIAL PROPERTY OF INSULATING FIREBRICK

Low heat conductivity is an important feature of "backing up" insulation, but is worthless unless accompanied by STABILITY. B&W Insulating Firebrick have low heat conductivity—plus exceptional stability. They withstand direct exposure and hence possess a high factor of safety when used for "backing up"

The Babcock & Wilcox Company
85 Liberty Street · New York, N. Y.

BABCOCK & WILCOX

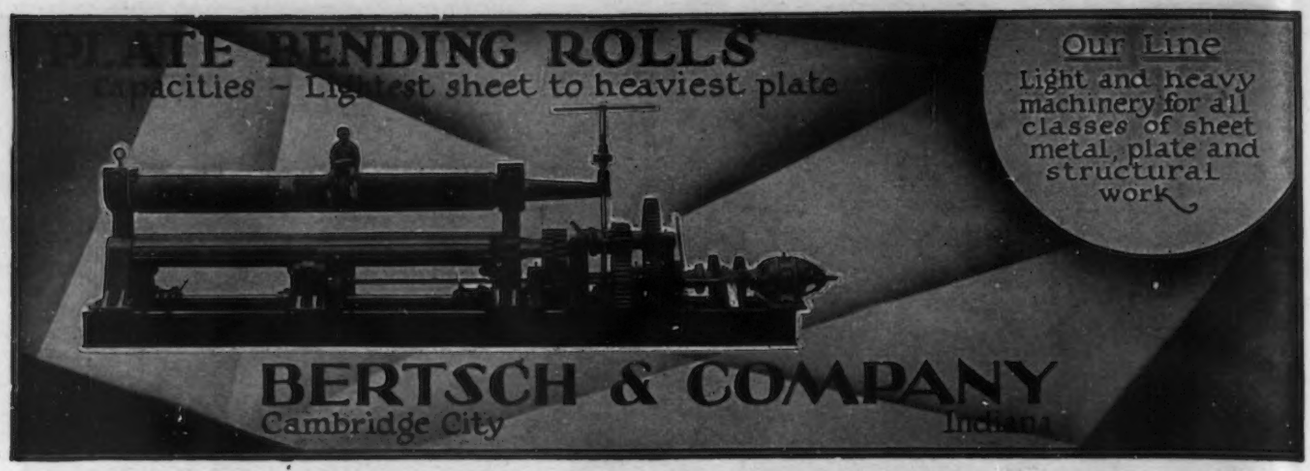


PLATE BENDING ROLLS
Capacities - Lightest sheet to heaviest plate
Our Line
Light and heavy machinery for all classes of sheet metal, plate and structural work
BERTSCH & COMPANY
Cambridge City
Indiana

Conomatics and Cone Automatics

Are economical and accurate producers of screw machine parts up to 6" diameter, 7" milling length. They cut costs, increase production, boost profits.

Write for particulars

CONE AUTOMATIC MACHINE CO., Inc.

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REPRESENTATIVES:

Detroit: J. C. Austerberry's Sons, 332 Curtis Bldg., Detroit, Mich.
Chicago: John H. Glover, 2127 North Sayre Ave., Chicago, Ill.
Ohio: S. B. Martin, 1077 Erie Cliff Drive, Lakewood, Ohio.
New England: Potter & Johnston Machine Co., Pawtucket, R. I.
Indiana: G. A. Richey, Chamber of Commerce Bldg., Indianapolis, Ind.
New York State: Syracuse Supply Co., Syracuse, N. Y.; also Buffalo, N. Y.
Pennsylvania: Arch Machinery Co., 1029 Park Bldg., Pittsburgh, Pa.
California: C. F. Bulotti Machinery Co., 829-831 Folsom St., San Francisco, Calif. Eccles & Davis Machinery Co., Inc., 1910 Santa Fe Avenue, Los Angeles, California.
Arthur Jackson Machine Tool Company, 60 Front Street West., Toronto 2, Canada, and 437 Grosvenor Avenue, Westmount, Que.

LELAND-GIFFORD COMPANY

Worcester, Mass.

Drilling Machinery

Belt and Motor Spindle

One to Six Spindles

Tapping Attachments and Multiple Heads

GOSS and DE LEEUW

MULTIPLE SPINDLE

CHUCKING MACHINES

Two, Four, Five Spindles • Work and Tool Rotating Types

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

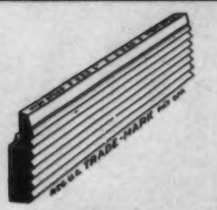
LUCAS "PRECISION"

Horizontal Boring, Drilling and Milling Machine

THE LUCAS MACHINE TOOL CO.

NOW AND ALWAYS OF

CLEVELAND, OHIO, U.S.A.



Landis makes a complete line of threading equipment. Depend upon it, if you have a threading operation, Landis has a machine, die head or tap that will handle the job to better advantage.

Write today for literature.

LANDIS MACHINE CO., Inc.

Waynesboro, Penna., U. S. A.

THE ATHENIA STEEL CO.

Clifton Ave., Clifton, N. J. Works, Athenia, N. J.

Makers of High Grade Tempered and Polished Steel for Clock, Watch, Meter and Typewriter Springs. Also Wound Springs, Tempered and Untempered Steel for other purposes. Special quality equal to finest imported for finish and accurate rolling. Also Stainless Steels of various grades.

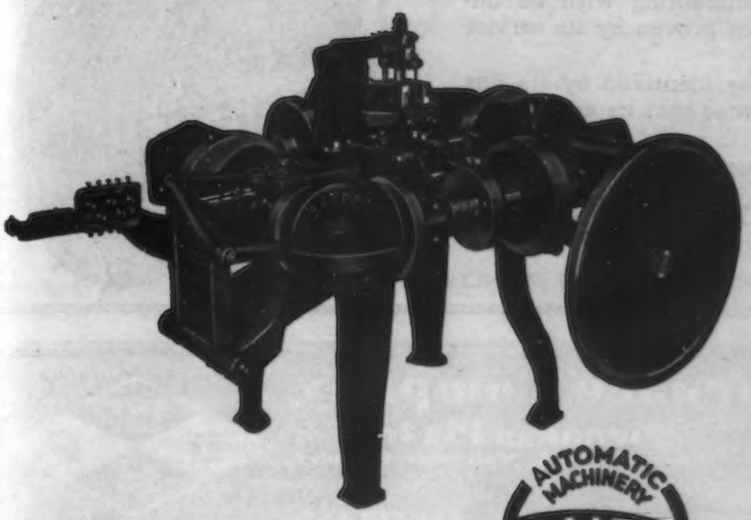
AGENTS:—

Lapham Hickey Co.—3333 W. 47th Place, Chicago, Ill.—414 United Artists Bldg., Detroit, Mich.
E. F. Krause & Co.—430-440 Commercial St., Los Angeles, Calif.
Hill Chase & Co.—Richmond and Ontario Sts., Philadelphia, Pa.
Wetherell Bros. Co.—251 Albany St., Cambridge, Mass.

"Presenting The Iron Age In Three Minutes" is the title of a booklet prepared for executives who are interested in advertising to the metal-working industry. Would you like a copy?

Baird Automatic
Wire and Ribbon

METAL FORMERS



Without sacrificing efficiency, Baird has been able to design a machine which can accommodate almost every type of wire and ribbon metal forming job in demand today.

This machine, the Baird Four Slider, is built in quantity, and many sizes are regularly carried in stock. Outstanding among its features are rigid construction, speedy and smooth operation, accessibility of tools, general openness of design throughout.

For work not exactly suited to this standard machine, special equipment is being designed constantly, and we are therefore in position to fill every possible requirement along this particular line.

THE BAIRD MACHINE COMPANY
BRIDGEPORT, CONN.

CROSBY *for* STAMPINGS

Serving Industry Since 1896

ALL our efforts have been concentrated on one product — STAMPINGS—for 40 years. We have made stampings, deep, intricate, heavy, light, large and small, for nearly every branch of industry.

Get Acquainted With Crosby Service

THE CROSBY COMPANY
General Offices and Works: BUFFALO, NEW YORK

Branch Offices: Chicago Detroit Cleveland New York Philadelphia

A Wire Rope with an Established Reputation

When you install a Hercules (Red Strand) Wire Rope on your equipment you are not experimenting with an untried product, for its ability has been proven by its service record.

Hercules Wire Rope can always be identified by its one red strand, which is also our guarantee that its exceptional quality is constantly maintained.

ESTABLISHED 1857

A. LESCHEN & SONS ROPE COMPANY
ST. LOUIS, MO.

NEW YORK CHICAGO DENVER SAN FRANCISCO

The Shenango Furnace Company

Lake Superior Iron Ores
Bessemer, Non-Bessemer, Aluminiferous

Shenango Pig Iron
Bessemer, Basic, Malleable, Foundry

Coal and Coke

OLIVER BLDG., PITTSBURGH UNION TRUST BLDG., CLEVELAND

THE S F CO.

HOLCROFT & COMPANY

LEADERS IN BUILDING AND DESIGNING ELECTRIC AND COMBUSTION FURNACES, KILNS AND OVENS.
HOME OFFICE: DETROIT—BRANCHES: CHICAGO, PHILADELPHIA
CANADA: WALKER METAL PRODUCTS, LTD., WALKERVILLE, ONT.

BUILT BY HOLCROFT & COMPANY DETROIT-MICH.

"The Skyscraper by the Sea"

An Invitation to members of the

NATIONAL METAL EXPOSITION

to make The Claridge their home during their Annual Convention, October 18th to 22nd, 1937.

European Plan: Single from $4.00
Double from $6. *Also American Plan*

For reservations call:
N. Y. Office: 500 5th Ave. · CHick. 4-6699
Washington Office: Phone District 2685
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Pittsburgh Office: Telephone Atlantic 6240

Hotel CLARIDGE

Joseph P. Binns, Manager

ATLANTIC CITY

AN *Integral Part* OF

THE NEW YORK THAT MATTERS

In the very midst of important New York and with direct connection to Grand Central, The Biltmore offers the luxurious comfort, distinctive atmosphere, and deft, flawless service of a fine, well-ordered home.

WORLD-FAMOUS DINING ROOMS

THE BILTMORE

David B. Mulligan, *President*
Madison Ave. at 43rd St., N. Y.
Adjoining Grand Central

JUST BETWEEN US TWO

At Your B. and C.

YEARS ago we heard a parlor story about a conductor and brakeman on a Canadian railroad who had had words. When their train stopped at Urillia, the conductor would pronounce it loudly, *"You're a liar, you're a liar,"* and the brakeman would respond, *"You really are, you really are."*

Now we learn there isn't any Urillia. The closest to it is Orillia, Ont., where our subscriber, the Tudhope-Anderson Co., Ltd., is situated. That company recently called upon us for some information, and if ever we can be of help to you, remember that the Reader Service Dept. lives to serve you.

More on Fettling

Both A.D.W. and F.I.A. remind us that "fettling" has another technical meaning besides its foundry application. You fettle a melting furnace when you repair its refractories. Fettling is "fixing up." You can fettle your lawn, your dog's tail, and you can unfettle a fairway.

Capitalizes on Cat's Crown

THE account of the dog with false teeth moved Reader No. 14 to tell us of the sad experience of a California druggist friend of his with Demon Rum. Years ago the druggist and the dentist upstairs celebrated Christmas Eve by drinking so much that they began to wonder how the drug-store cat would look with a gold-crowned tooth.

So they gave the cat gas and placed a shiny crown over a front tooth. People came from miles around to see it. Store traffic increased 500 per cent, and the druggist retired wealthy.

Citrus Christening

ACCORDING to an advertising agency personnel list we saw the other day, the assistant treasurer of J. Walter Thompson Co., New York City, is Luther Orange Lemon.

Orchid

"The advertising pages as well as the editorial matter in The Iron Age are read regularly and carefully by all of our executives.

"We find the ads very interesting and attractive and get some good information from them. We consider the advertising in The Iron Age of real value."

—A Milwaukee manufacturer of metal products.

Preachment

WHICH leads us to question the worth of the advice frequently found in advertising journals that, inasmuch as industrial executives are, after all, human beings, industrial advertising might well increase its entertainment content.

We think the advisers overlook the fact that the sane mind is complex and compartmented. A time for this and a time for that. This is no plea for unrelieved heaviness in industrial advertising. An adroit light touch may drive home a point more surely and swiftly than a sledge hammer. But entertainment for its own sake is as out of place as a preachment in a night club.

Problem

ACCORDING to D.C.W., Christ Church College, Oxford, has been trying since 1450 to explain the following problem and hasn't succeeded yet:

Question: How can two wheels of different circumferences cover equal distances in one complete revolution? Obviously the answer is that they can't. But if you bind a wheel of 2-ft. circumference center to center with a wheel of 3-ft. circumference, both move three feet in one complete revolution.

"Why?," asks D.C.W. We are inclined to view the problem as screwy and to answer offhand that the smaller wheel travels two feet on its own periphery and gets a free ride the other foot. But you can't answer as simply as this something that has been making Oxford dons dyspeptic for five centuries. Or maybe there is even less to it than meets the eye.

Slogans

The best slogan we have heard recently is that used by a Southern publication (we forget the name), *"Covers Dixie Like the Dew."* The worst is the battle cry of New Jersey's capital, *"Trenton Makes—The World Takes."* The punniest —offered by a friend of ours to the Sloan's Liniment people in the event that they should embark upon an advertising campaign in the Orient—*"Oil for the Lumps of China."*

—A.H.D.

Here's News for YOU...

That you and your secretary, with shorthand, spend about twice the time that you ought to on each day's mail. The answer lies in a technique so simple it's amazing . . . and impossible the shorthand way.

That your phone calls can be put on the record while they happen with Dictaphone — thus making orders given or taken mistake-proof and alibi-proof. You'll be interested to see how *easily* it's done.

That your whole staff works better and more smoothly with the Dictaphone. Less confusion. Fewer misunderstandings. *More* gets done . . . at an *easier* pace!

That shorter conferences are one of the biggest benefits of this modern dictating machine. And not just shorter, but *meatier*, too. Most men find this an especially fascinating part of a Dictaphone demonstration.

That the whole story of Dictaphone . . . what it does, and who now uses it, and how they like it . . . is yours for the asking. In your own office. As briefly told as you wish. With no obligation. *Mail the coupon and we'll do the rest!*

THE TREND TO

DICTAPHONE

SWEEPS ON

Dictaphone Sales Corporation, 420 Lexington Avenue, New York City I-9
In Canada—86 Richmond Street, West, Toronto

☐ Please let me know when "Two Salesmen in Search of an Order" will be exhibited in my city.

☐ I want to see your representative.

*Name*_____

*Company*_____

*Address*_____

The word DICTAPHONE is the Registered Trade-Mark of Dictaphone Corporation, Makers of Dictating Machines and Accessories to which said Trade-Mark is Applied.

KEEP YOUR DRILLS IN A
DRILL—INDEX
MADE LIKE A CARD INDEX
A Flip of Wrist Opens or Closes
Made in Six Sizes
ASK YOUR DEALER OR WRITE TO
HUOT MFG. CO., 500 Robert Street, ST. PAUL, MINN.

Cutting Off Machines for Sawing All Kinds of Metals
THE ESPEN-LUCAS MACHINE WORKS
FRONT AND GIRARD AVE., PHILADELPHIA, PENNA.

Grinding
Polishing
Sanding
Drilling
Reaming
Strand
Nut Setting
Screw Driving
Rotary Filing
Stainless Steel
Weld Finishing
Flexible Shafts and Machines
Vertical and Horizontal Types—¼ to 2 H.P.
Send for General Catalog
N. A. STRAND & CO.
5001 No. Lincoln St. Chicago

THE CLEVELAND STEEL TOOL CO.
Punches, Dies, Chisels, Rivet Sets
660 E. 82nd St. Cleveland, O.
If it's RIVETED you KNOW it's safe

Famous for quality of threads they produce, long life of chasers and all-around dependability.
Following literature available:
Bulletin on H & G General Purpose Die Heads.
Bulletin on new Insert Chaser Type of Die Head.
Bulletin on H & G Threading Machines.
See our Advt., page 220, April Machinery.
The Eastern Machine Screw Corp.
21-41 Barclay Street, New Haven, Conn.
Los Angeles: A. C. Behringer, 312 Commercial St., Los Angeles, Cal. San Francisco: Guy Reynolds, 464 Vernon St., Oakland, California.
H&G DIE HEAD
Die Heads

MARVEL Tapping Machines
7 Models (sizes) 7 Capacity Ratings.
7 Spindle Speeds.
A Complete Line of horizontal, friction type, motor driven Tapping Machines that do the work of much more expensive and complicated machines. Fine Thread 0 to ½" U.S.S. Taps in Steel. Complete accessories for all models.
Armstrong-Blum Mfg. Co. 5748 Bloomingdale Ave., Chicago, Ill. *"The Hack Saw People"*
Write for Bulletin No. 500

FRICTION FEARS THIS FOE
Rely on Abbott for steel balls in precision and commercial tolerances.
THE ABBOTT BALL COMPANY
1047 New Britain Ave., Hartford, Conn.
ABBOTT BEARING BALLS

"METALINE"
(REGISTERED TRADE MARK)
OILLESS BRONZE BEARINGS
R. W. RHOADES METALINE CO., INC.
43—3RD ST. LONG ISLAND CITY, N. Y.

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ABRASIVE WHEELS—See Grinding Wheels
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Hydraulik Gmbh. Duisburg, Germany.
Lake Erie Engineering Corp., 68 Kenmore Sts., Buffalo, N. Y.
Wood, R. D., & Co., Philadelphia.
ACETYLENE—Dissolved in Cylinders & Small Tanks
Air Reduction Sales Co., 60 East 42nd St., N. Y. C.
Linde Air Prods. Co., The, 30 East 42nd St., N. Y. C.
ACID-PROOF CEMENT
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
ACID-PROOF CONSTRUCTION
Atlas Mineral Prods. Co. of Pa., The, Mertztown, Pa.
ACIDS—Pickling
American Chemical Paint Co., Ambler, Pa.
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
AIR CONDITIONING EQUIPMENT
American Blower Corp., 6000 Russell St., Detroit
AIRMETERS AND VOLTMETERS
Weston Electrical Instrument Corp., Newark, N. J.
AIR TANKS AND CYLINDERS
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Scaife, William B., & Sons Co., Ptgh.
ALLOYS—Copper
American Brass Co., The, Waterbury, Conn.
ALLOYS—Ferro
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ALLOYS—Tungsten
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
ALLOYS—Vanadium
Vanadium Corp. of America, 420 Lexington Ave., N. Y. C.
ALLOYS—Zinc Base Die Casting
New Jersey Zinc Co., The, 160 Front St., N. Y. C.
ALUMINUM
Aluminum Co. of America, Pittsburgh.
Seligman, Arthur, & Co., Inc., 30 Rockefeller Plaza, R. C. A. Bldg., N. Y. C.
AMMETERS AND VOLTMETERS—Recording
Leeds & Northrup Co., Philadelphia.
AMMONIA RECOVERY PLANTS
Koppers Co., Pittsburgh.
ANGLES, BEAMS, CHANNELS AND TEES
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.
ANGLES, BEAMS, CHANNELS & TEES—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.
ANNEALING—See Heat Treating
ANNEALING BOXES
Lebanon (Pa.) Steel Foundry.
Petroleum Iron Works Co., Inc., Sharon, Pa.
United Engineering & Fdry. Co., Ptgh.
ANNEALING COVERS
Petroleum Iron Works Co., The, Sharon, Pa.
Surface Combustion Corp., 2375 Dorr St., Toledo.
ANODES—All Types
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Seymour (Conn.) Mfg. Co.
Udylite Co., The, Detroit.
ANODES—Cadmium
Du Pont de Nemours, E. I., & Co., Inc., Grasselli Chemicals Dept., Wilmington, Del.
Udylite Co., The, Detroit.
APPAREL—Welding
Lincoln Electric Co., The, Cleveland.
ARBORS
Cincinnati (Ohio) Milling Mch. Co., The.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
ARMORING MACHINERY—Cable, Wire, Hose
Sleeper & Hartley, Inc., Worcester, Mass.
ARRESTERS—Spark
Harrington & King Perforating Co., Chicago.
ASBESTOS
Carey, Philip, Co., The, Cincinnati.
AXLES—Car or Locomotive
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
BABBITT METALS
Cadman, A. W., Mfg. Co., Pittsburgh, Pa.
BALANCING EQUIPMENT
Cisholt Machine Co., Madison, Wis.
BALING PRESSES—Scrap—See Presses—Baling
BALLS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.
BALLS—Steel, Brass or Bronze
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Hartford (Conn.) Steel Ball Co., The.
New Departure Div., General Motors Corp., Bristol, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
BANDS—Steel
Acme Steel Co., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
BANDS—Welded
Amer. Welding & Mfg. Co., Warren, O.
BARRELS—Burnishing
Abbott Ball Co., The, 1047 New Britain Ave., Hartford, Conn.
Ransohoff, N., Inc., Cincinnati.
BARRELS—Tumbling
Baird Mch. Co., The, Bridgeport, Conn.
Hartford (Conn.) Steel Ball Co., The.
Ransohoff, N., Inc., Cincinnati.
Whiting Corp., Harvey, Ill.
BARS—Alloy
Republic Steel Corp., Cleveland, Ohio.
BARS—Aluminum
Aluminum Co. of America, Pittsburgh.
BARS—Brass, Bronze or Copper
Bunting Brass & Bronze Co., Toledo, Ohio.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
BARS—Cold Drawn
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Chicago.
Bliss & Laughlin, Inc., Harvey, Ill.
Union Drawn Steel Co., Massillon, Ohio.
BARS—Concrete, Reinforcing
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
BARS—Magnesium Alloys
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.
BARS—Rustless
Rustless Iron & Steel Corp., Baltimore, Md.
BARS—Steel
Ames, W., & Co., Jersey City, N. J.
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Detroit.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Steel & Tubes, Inc., Cleveland.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Weirton (W. Va.) Steel Co.
Youngstown (Ohio) Sheet & Tube Co., The.
BATTERIES—Storage
Electric Storage Battery Co., The, Phila.
BATTERY CHARGERS
Cutler-Hammer, Inc., Milwaukee.
BEAMS—See Angles, Beams, Channels and Tees
BEARINGS—Babbitt
Cadman, A. W., Mfg. Co., Pittsburgh, Pa.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
BEARINGS—Ball
Bantam Bearings Corp., The, South Bend, Indiana.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
New Departure Div., General Motors Corp., Bristol, Conn.
Norma-Hoffmann Bearings Corp., Stamford, Conn.
SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
Schatz Mfg. Co., Poughkeepsie, N. Y.